

Explorer™ EX4 Plus 35 Mobile Digital Video Recording (DVR) System

Installation and User's Guide



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Seon Design® Inc.

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Who This Guide is For

The *Installation and User's Guide* is intended for anyone who needs to install and operate the Explorer EX4 Plus 35 Mobile Digital Video Recording (DVR) System (EX4 Plus 35 System).

This Guide provides information and procedures for installing, configuring, operating, maintaining, and troubleshooting the EX4 Plus 35 System.

Conventions Used



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or to other equipment.

Important: These notes describe things which are important for you to know, but they not as serious as a Caution.

Abbreviations and Acronyms

Acronym	Definition
DVR	Digital video recorder
FPS	Frames per second
GPS	Global Positioning System
HD	Hard drive
IPS	Images per second
IR	Infrared
LAN	Local area network
MPEG	Moving Picture Experts Group
RA	Return Authorization
TCM	Transmission Control Module
UTC	Universal Time Coordinated

Related Documentation

Refer to the following related documentation.

Document Name	Document Part Number
SA Series Wedge Camera Setup Guide	700-0004
SJ Series Dome Camera Setup Guide	700-0049
HD Reader User’s Guide	700-0036
TR-INR Inertia Sensor Installation and User Guide	700-0041

Finding Information Online

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CHAPTER 1

Introduction

This chapter describes the product features and components of the Explorer EX4 Plus 35 Mobile Digital Video Recording (DVR) System (EX4 Plus 35 System).

1.1. EX4 Plus 35 System

The EX4 Plus 35 System consists of the following components:

- EX4 Plus 35 DVR
- Lock box
- Cameras
- Hard drive
- Driver's indicator panel (video recording label optional)
- GPS (Global Positioning System) (if purchased)
- Smart-Link™ module
- Cables and harnesses for power, ignition input, Smart-Link interface, alarms and signals

1.2. EX4 Plus 35 System Product Features

The EX4 Plus 35 System has been designed using extremely reliable and easy-to-use technology, including:

- Rugged digital video recorder
- MPEG-4 compression
- Four video channels and two audio channels
- Selectable image quality, resolution, and recording rate
- Replaceable/upgradeable hard drives to extend recording times
- Downloadable images and video using USB memory devices
- On-screen display of time, date, vehicle identification, and system voltage
- Integrated Ethernet network connection for LAN interfaces or other high-speed expansion devices
- Smart-Start™ to prevent potential damage from voltage spikes and drops during vehicle start-up
- Advanced Smart-Temp™ and built-in heater to ensure safe operation over a wide temperature range
- Smart-Link™ module for signal interfaces, including:
 - GPS data and vehicle speed
 - Ten different input signals, including CAN signals
 - Driver's indicator panel
 - 4 different event alarm inputs
- Configurable software
 - Repeat recording, user selectable ON or OFF
 - Variable record delay-on and record delay-off recording, selectable up to 60 minutes
 - Twelve daily/weekly timers to set DVR recording time
- Temporary power for setup and playback
- Front panel video output jack for setup and playback

1.3. EX4 Plus 35 DVR

1.3.1. DVR Front Panel Features

The EX4 Plus 35 DVR front panel has important features such as the hard drive lock, removable hard drive, SHUTTLE/JOG wheel, indicator lights, the DVR buttons, the USB port, and the VIDEO OUT jack. See Figure 1-1.

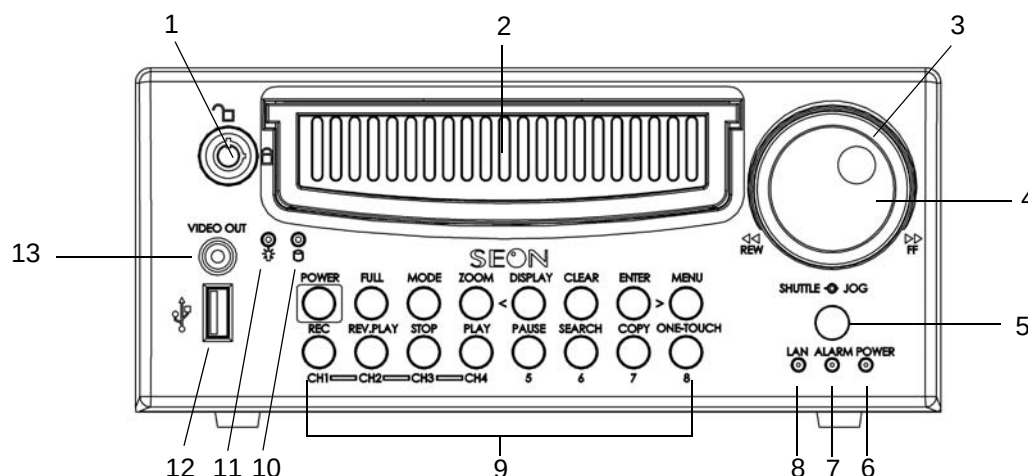


Figure 1-1 EX4 Plus 35 DVR front panel

Table 1-1 Front panel features

Item	Feature	Description
1	Hard Drive lock (Unlocked and locked positions)	Requires the proper key to unlock the hard drive prior to removing and locking the hard drive during operation. When the DVR is recording, press the STOP button before unlocking and removing the hard drive. (For more information, see “4.3. Replacing the Hard Drive” on page 4–6.)
2	Removable Hard Drive	Remove the hard drive for playback at a remote location using the HD Reader (see “4.4. Downloading Video to a PC” on page 4–6), swap to another DVR, or upgrade to a larger hard drive.
3	SHUTTLE wheel (outer wheel)	- During playback, turning the SHUTTLE wheel clockwise speeds the play forward from 1× to 2×, 4×, 6×, 8×, 16× and 32× the normal speed. - During reverse playback, turning the SHUTTLE wheel counter clockwise speeds the play backward from 1×, 2×, 4×, 6×, 8×, 16× and 32× the normal speed. - When the PAUSE button is pressed, turning the SHUTTLE wheel clockwise reduces the play to a very slow forward rate. - When the PAUSE button is pressed, turning the SHUTTLE wheel counter clockwise reduces the play to a very slow backward rate.
4	JOG wheel (inner wheel)	- Used to change the values of menu items. - When PAUSE button is pressed, turning the JOG wheel clockwise or counter clockwise moves the image one at a time.

Table 1-1 Front panel features

Item	Feature	Description
5	Infrared (IR) Remote Control receiver	Used with the optional IR remote control pointed at the receiver.
6	POWER—DVR Power indicator (green)	Illuminates when the DVR is powered up.
7	ALARM—Alarm Event indicator (red)	Illuminates when an external alarm input has been initiated and remains illuminated for the duration of the alarm.
8	LAN—Network indicator (red)	Illuminates when connected to an active network.
9	DVR Buttons	See Table 1-2.
10	Hard Drive Access indicator (yellow)	Illuminates when the DVR is accessing the hard drive.
11	Hard Drive Power indicator (green)	Illuminates when the hard drive has been properly inserted in the hard drive tray, and the hard drive lock is in the locked position.
12	USB Port	Supports USB devices for: • Copying video and audio information. • Exporting video clips (See “4.5.2. Using the ONE-TOUCH Download option” on page 4–7.) • Updating the DVR software. • Importing/exporting operating settings and profiles.
13	VIDEO OUT—Video Output jack (yellow)	VIDEO OUT jack has the same function as the VIDEO OUT jack on the back of the DVR. Only one device at a time can be connected to either jack. VIDEO OUT jack is used for: • Live viewing • Playback • System configuration

1.3.2. DVR Buttons

The DVR buttons on the front panel illuminate when the buttons are activated. The DVR buttons perform more than one function and are described briefly in Table 1-2.

Chapter 4, “Operating the DVR” provides detailed information on using the DVR buttons. See “4.1.1 Using the DVR buttons” on page 4–2.

Table 1-2 Description of DVR buttons

Button	Description
POWER	With the vehicle ignition turned OFF and the DVR powered off, pressing the POWER button for 3 seconds powers up the DVR, but does not initiate recording. With the vehicle ignition turned OFF and the DVR still powered up in the RECORD DELAY-OFF interval, pressing the POWER button for 5 seconds powers down the DVR immediately. With the vehicle ignition turned ON, pressing the POWER button for 5 seconds during the RECORD DELAY-ON interval powers up the DVR and starts recording.
FULL	Use the FULL button in combination with one of the four camera buttons (CH1, CH2, CH3, or CH4), and the DVR displays the selected camera in full screen display mode.
MODE	Pressing the MODE button changes the display.
ZOOM	In full screen display mode, pressing the ZOOM button zooms into the screen 2×.
DISPLAY <	While the DVR is recording in live mode, different information can be displayed on the screen.
<	The < button is used to navigate the menus while configuring the DVR.
CLEAR	When configuring the DVR, pressing the CLEAR button loads the factory default value into the field being edited.
LOCK >	Pressing the LOCK button enables a One-Time password option.
>	The > button is used to navigate the menus while configuring.
MENU	Pressing the MENU button enters and exits the main menu of the DVR.
REC (CH1)	Pressing the REC button starts the DVR recording if the DVR is not playing video or in the menus. When the DVR is recording, the REC button is illuminated.
REV.PLAY (CH2)	During playback or when the video is stopped, pressing the REV.PLAY button starts playing the video in reverse.
STOP (CH3)	Pressing the STOP button stops the DVR from recording or playing.
PLAY (CH4)	If the DVR is not recording, pressing the PLAY button starts to play the recorded video and audio.
PAUSE (5)	Pressing the PAUSE button pauses the video playback and provides a still frame video image.
SEARCH (6)	Pressing the SEARCH button provides a power search function to quickly find the desired information. Exit the Search menu by pressing the MENU button.
COPY (7)	Pressing the COPY button take you to the Copy menu. Exit the Copy menu by pressing the MENU button.
ENTER/ONE-TOUCH (8)	While configuring in the menus, pressing the ENTER button lets you navigate to the selected sub-menu. Pressing the ONE-TOUCH button starts One-touch download. For more information, see “4.5.2. Using the ONE-TOUCH Download option” on page 4–7.

1.3.3. DVR Back Panel Features

The back panel of the EX4 Plus 35 DVR features the inputs where the DVR connects to the other components of the EX4 Plus 35 System. See Figure 1-2.

Chapter 2, “Installation” provides detailed information on connecting to the back panel. See “2.5.1. Connecting to the DVR Back Panel” on page 2–8.

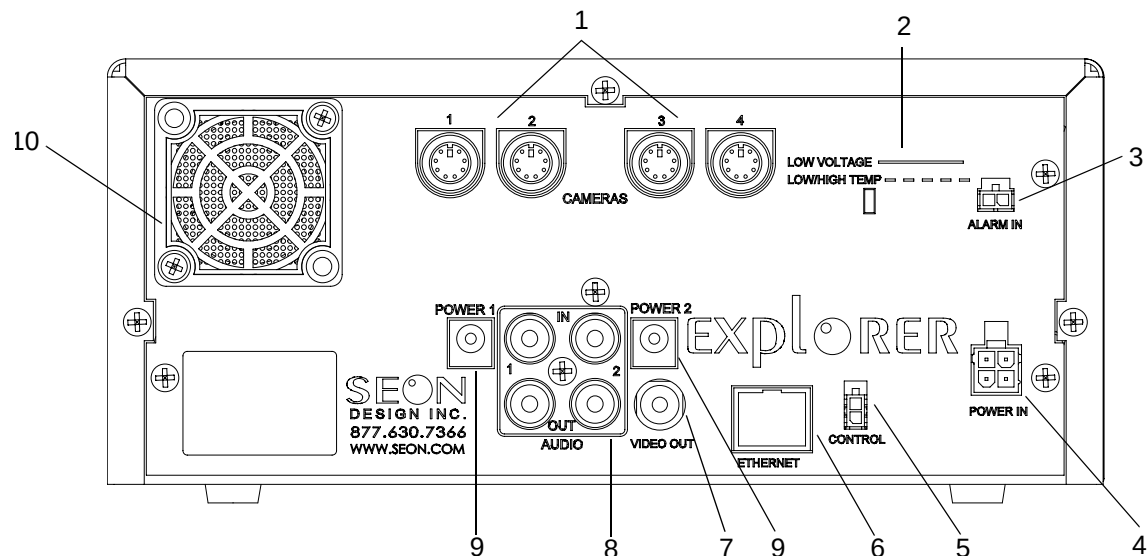


Figure 1-2 Back panel

Item	Feature	Description
1	CAMERAS	Camera input connectors: 6-pin mini-DIN
2	LOW VOLTAGE LOW/HIGH TEMP	Low voltage and Low/High temperature indicator (red)
3	ALARM IN	Alarm input connector: 2-pin
4	POWER IN	Power input connector: 4-pin
5	CONTROL	Control connector: 2-pin
6	ETHERNET	Network connector: RJ-45
7	VIDEO OUT	Video output jack: Yellow RCA style
8	AUDIO IN 1, 2 AUDIO OUT 1, 2	Audio input jacks: White RCA style for Audio In Audio output jacks: Red RCA style for Audio Out
9	POWER 1 POWER 2	Auxiliary Power jacks: 2.1 mm barrels
10	FAN	Fan with filter and removable cover

1.4. Lock Box

The lock box secures the DVR into a location on the bus and provides the following features:

- A locking door which prevents unauthorized access to the DVR controls. Authorized personnel can use the lock box key to remove the hinged locking door when access to the DVR is necessary.
- A sliding rail system which allows for easy DVR installation and exchange.
- A slotted cable entry allows connectors to be inserted into the lock box after installation.
- A removable, hinged locking door, rounded to prevent injury from sharp edges.
- Mounting patterns that can accommodate installation flat on the floor, vertically on the floor, or under a seat. (For installing the DVR under a seat, use of the Underseat Mounting Bracket Kit is recommended. For installing the DVR in a vertical mount, the Vertical Mounting Bracket Kit is recommended. Contact your sales representative at Seon Design for more information.)

1.5. Cables and Harnesses

The wiring connections to the EX4 Plus 35 System includes:

- A camera cable comes with the camera, using a single connector for ease of installation.
- An ignition input harness.
- A high-reliability power harness for providing power to the DVR.
- A driver's indicator panel to allow easy event searching on the DVR.
- In-line fuses on the power and ignition lines for added protection.

CHAPTER 2

Installation

This chapter provides information and procedures for installing the EX4 Plus 35 System.

2.1. Installing the EX4 Plus 35 DVR and Lock Box

The EX4 Plus 35 DVR is designed to be installed in the lock box which is secured to the mounting surface using the screws provided. The lock box can be installed flat on the floor or under a seat (horizontal installation) or vertically on the floor (vertical installation), depending on your requirements. The lock box has a removable, hinged locking door, and a slide rail system to allow for easy installation and exchange of the DVR.

The EX4 Plus 35 DVR has connections to the front and back of the unit which are secured once the DVR is installed and the lock box is locked. Cable grommets on the lock box allows connectors to be inserted into the lock box after installation.

Planning an installation

Check that you have all the system components and inspect the units for any scratches or damage. The lock box key is required to unlock the door of the lock box, and remove the components that are placed inside the box for shipping such as cameras and harnesses.

Materials required

You will need these materials to complete the installation:

- EX4 Plus 35 DVR
 - DVR keys for securing the removable hard drive
- Lock box
 - Lock box keys for securing the hinged locking door
- Cameras
- Driver's indicator panel
 - Seon video recording label (if purchased)
- Smart-Link™ module
 - Smart-Link-to-DVR connection harness (10 feet)
- Power and ignition harness (3 feet)
 - Fuses: 5 A power fuse and 1 A ignition fuse
 - Fuse holders
- Alarm input cable (3 feet)
- Signal harness (3 feet)
- Speed cable (20 feet) (if purchased)
- GPS receiver and cable (if purchased)
- CAN interface cable (if purchased)
- Butt splice connectors
- Four #10 × ¾" sheet metal screws
- Four #10 × 1" self-drilling screws

Longer cables

To customize your installation, longer cables are available by contacting your sales representative at Seon Design.

Important note

Important: If you are mounting the lock box under a seat, please contact your Seon Design sales representative or dealer for information on the Underseat Mounting Bracket Kit before starting the installation.

Important: If you are mounting the lock box vertically, please contact your Seon Design sales representative or dealer for information on the Vertical Mounting Bracket Kit before starting the installation.

2.2. Step 1: Installing the Lock Box

The lock box has a door and lid which need to be removed in order to secure the base in its location. The lock box can be mounted either on the floor or underneath a seat.

Important: If you are mounting the lock box under a seat, contact your Seon Design sales representative or dealer for information on the Underseat Mounting Bracket Kit.

The lock box can be installed horizontally (see “2.2.1. Horizontal Installation”). Four mounting points are located on the base of the lock box for securing the unit and raising the unit off the mounting surface by 3/16".

The lock box can be installed vertically (see “2.2.2. Vertical Installation” on page 2–4). Three mounting points are located on the back of the unit for securing the unit and raising the unit off the mounting surface by 3/16".

Important: It is not recommended that the lock box be installed on its left or right side where the cables enter the unit.

2.2.1. Horizontal Installation

To install the lock box horizontally:

1. Unlock the door with the lock box key provided and remove it from the base of the lock box.
2. Slide the DVR out of the lock box by pulling on the two bracket tabs at the front of the DVR.
3. Detach the lid from the lock box by removing the two retaining screws on either side of the lid near the front of the lock box.
4. Determine whether the power and camera cables will enter the lock box on the left or the right side. Swap the cable grommet and the hole plug, if necessary. See Figure 2-1.
5. Use the four #10 × ¾" sheet metal screws or #10 × 1" self-drilling screws to secure the base of the lock box to the floor.
6. Slide the lid on to the lock box and secure it with the two retaining screws.

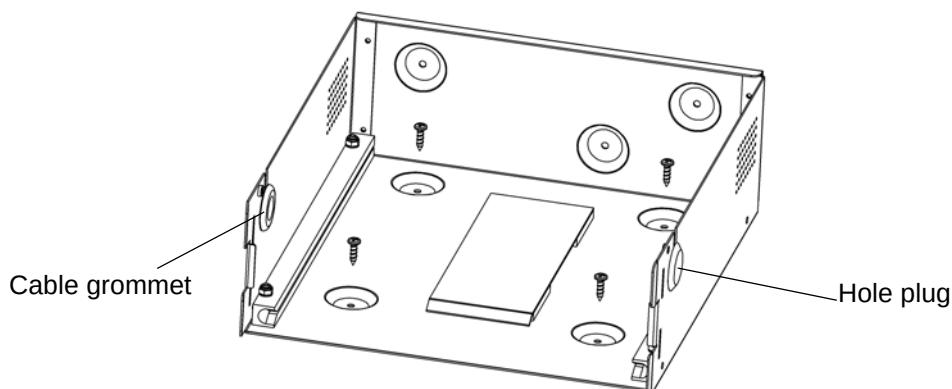


Figure 2-1 Lock box horizontal installation

2.2.2. Vertical Installation

For installation in a difficult location, the lock box can be mounted vertically.

Important: It is highly recommended that the Vertical Mounting Bracket Kit is used to help stabilize the lock box in a vertical installation. If you are mounting the lock box vertically, please contact your Seon Design sales representative or dealer for information on the Vertical Mounting Bracket Kit before starting the installation.

To install the lock box vertically:

1. Unlock the door with the key provided and remove it from the lock box base.
2. Slide the DVR out of the lock box by pulling on the two bracket tabs at the front of the DVR.
3. Detach the lid from the lock box by removing the two retaining screws on either side of the lid near the front of the lock box.
4. Determine if the power and camera cables will enter the lock box on the left or the right side. Swap the cable grommet and the hole plug, if necessary.
5. Use 3 of the enclosed #10 × ¾ sheet metal screws or #10 × 1 self-drilling screws to attach the lock box to the floor. See Figure 2-2.
6. To prevent excess vibration, use the remaining #10 × ¾ sheet metal screw or #10 × 1 self-drilling screw to secure the lock box to a vertical surface.
7. Reattach the lock box lid using the two screws removed earlier.

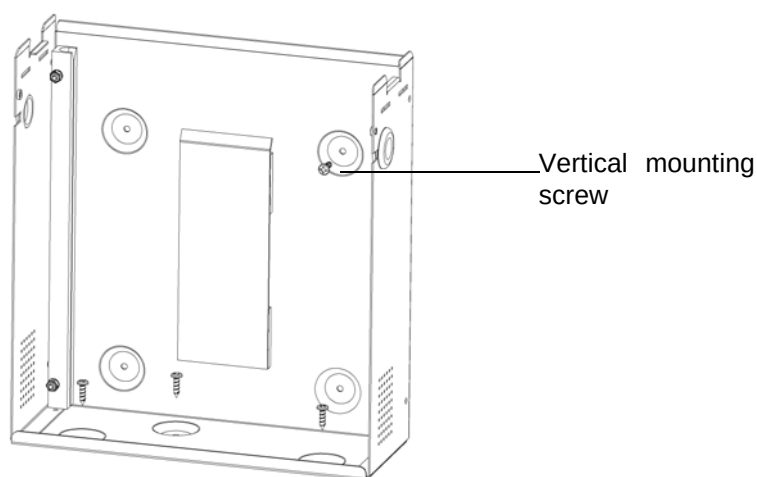


Figure 2-2 Lock box vertical installation

2.3. Step 2: Installing the DVR in the Lock Box

The DVR has two brackets attached to the sides that allow it to slide easily in and out of the lock box. The brackets also enable easy top-up orientation of the DVR when the unit is installed on the floor or under a seat.

The rear of each bracket has two plastic retainers that allow cables to easily slip in between to ensure they do not get pinched at the back of the lock box when the DVR slides in. See Figure 2-3.

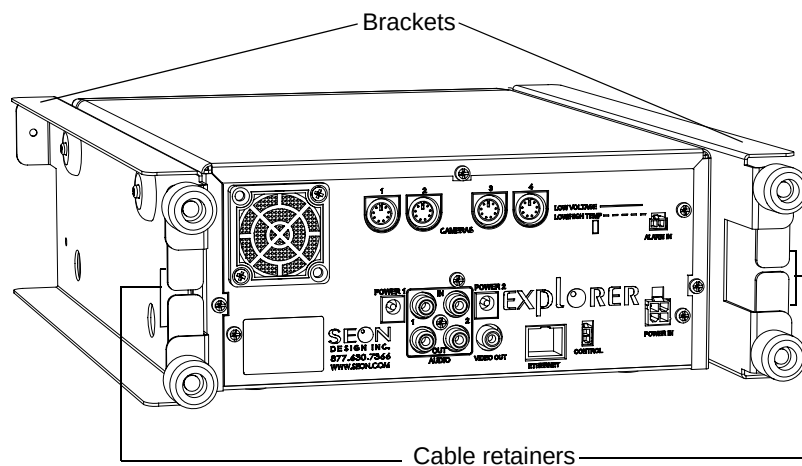


Figure 2-3 Brackets and cable retainers

2.4. Step 3: Installing the Cameras

If you have purchased cameras from Seon Design, install the cameras according to the documentation that shipped with the product.

If you have cameras already installed, see “2.4.1. Checking the Camera Cable Connections”.

2.4.1. Checking the Camera Cable Connections

The EX4 Plus 35 System uses an integrated mini-DIN connector for all of the camera signals. The cable comes prewired into the camera, but if the cable becomes disconnected, reattach into the terminal blocks inside the camera. See Figure 2-4. The cable colors for correct wiring to the terminals are described in Table 2-1. For complete camera information, see the product insert for the camera (for example, *SA Series Wedge Camera Setup Guide* document part number 700-0004).

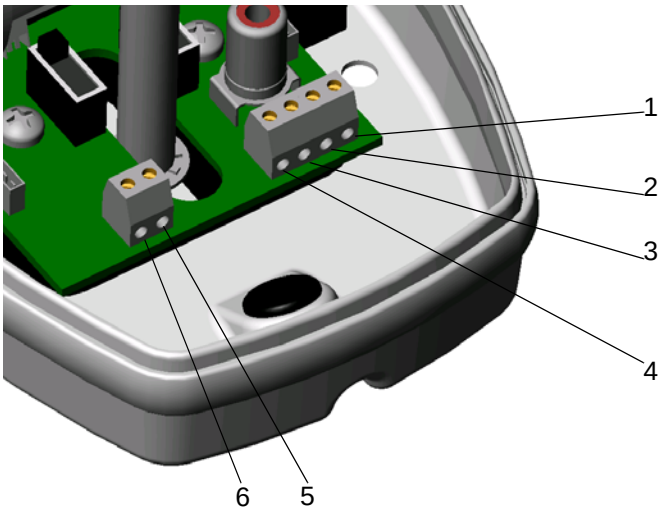


Figure 2-4 Terminal blocks in the camera

Table 2-1 Camera cable wiring

Item	Color	Description
1	Red	Power positive (+)
2	Black (and silver)	Power ground (–)
3	Green	Audio positive (+)
4	White	Audio ground (–)
5	Yellow or orange	Video positive (+)
6	Blue or brown	Video ground (–)

The camera cable should be long enough to reach from a camera mounted to the header or ceiling of a bus down to the DVR lock box. Different cable lengths can be obtained by contacting Seon Design.

The camera cable can be surface run or concealed.

Surface run
Installation

If the installation is surface run, ensure that the camera cable is secured at multiple points and is protected from sharp corners.

Concealed
Installation

If the cable is concealed, it can be pulled from either end. Pulling from the connector end requires larger holes in panels. Pulling from the wire end requires the cable to be disconnected from the camera.

Feed the cable through the large cable grommet on the DVR lock box. The connectors can be fed through the grommet one at a time, or the grommet can be cut at the top and the cables can be simply slid into the grommet. Leave enough cable in the DVR lock box to allow the DVR to slide all the way back.

2.5. Step 4: Connecting the DVR

2.5.1. Connecting to the DVR Back Panel

Figure 2-5 shows the back panel of the EX4 Plus 35 DVR which provides the connectors for the camera inputs, alarm input cable, power input harness, control cable, Ethernet, video in and out, audio in and out, and power.

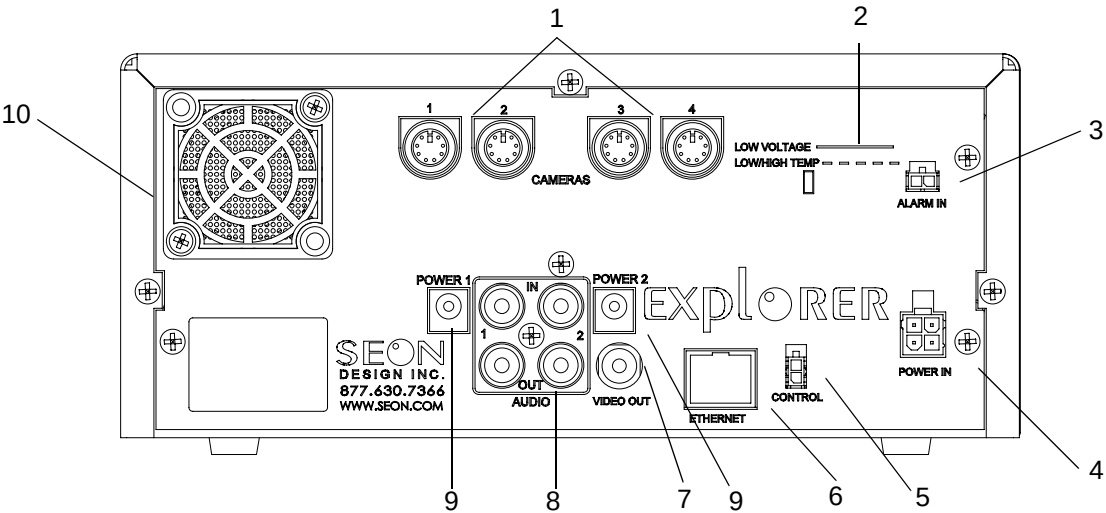


Figure 2-5 Back panel connections

Item	Feature	Description
1	CAMERAS	Four camera input connectors: 6-pin mini-DIN
2	LOW VOLTAGE LOW/HIGH TEMP	Low voltage and Low/High temperature indicator (red) illuminates if the voltage is low. (See “4.6. Voltage Display” on page 4–13.)
3	ALARM IN	Alarm input connector (2-pin) for connecting the alarm input cable.
4	POWER IN	Power input connector (4-pin) for connecting the Smart-Link-to-DVR harness.
5	CONTROL	Control connector (2-pin) for connecting external devices and controlling the wireless bridge equipment.
6	ETHERNET	Network connector: RJ-45 for connecting to LAN. Ethernet is used to connect either to a PC or directly to the wireless bridge equipment.
7	VIDEO OUT	Video output jack (yellow RCA style) for playback. (A video output jack is also provided on the front panel of the DVR. Only one device at a time can be connected to either jack.)
8	AUDIO IN 1, 2 AUDIO OUT 1, 2	Audio input jacks (white RCA style) used with the two power output jacks for optional remote microphones or IR modules. Audio output jacks (red RCA style) for playback.
9	POWER 1 POWER 2	Auxiliary Power jacks (2.1 mm barrels)
10	FAN	Fan with filter and removable cover keeps the unit cool. (For maintaining the filter, see “5.1.3. Replacing the Fan Filter” on page 5–2.)

To connect to the back of the DVR:

1. Plug the 6-pin mini-DIN connector from each camera into the mating connector on the back of the DVR. See Figure 2-5.
2. Plug one end of the Smart-Link-to-DVR connection harness into the POWER IN connector. The connectors on the harness are identical so that either end can be plugged into either device. See Figure 2-6.

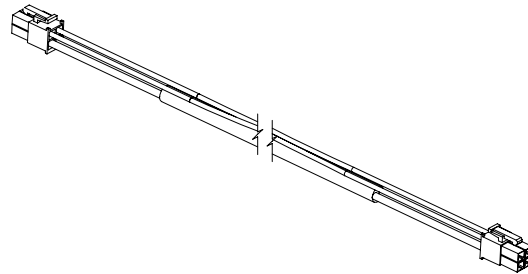


Figure 2-6 Smart-Link-to-DVR connection harness

The other end of the Smart-Link-to-DVR connection harness is connected once the Smart-Link module has been installed. See “2.7. Step 6: Installing the Smart-Link™ Module” on page 2–11.

3. If an optional external microphone is being used, plug the power connection into either POWER 1 or POWER 2.
4. Plug the RCA connector into the AUDIO IN 1 or AUDIO IN 2 jack. See “2.4.1. Checking the Camera Cable Connections” on page 2–6 about disconnecting the audio from a camera when using the external microphone.
5. Push the cables into the cable retainers on the back of the DVR brackets and slide the DVR into the lock box.

Important: Take care not to pinch or bind any cables when sliding the DVR into the lock box.

2.6. Step 5: Connecting the Power and Ignition Harness, Fuses, and Fuse Holders

Important: The supplied in-line automotive fuse holders are for protecting the red battery positive wire and the yellow ignition trigger wire. Butt-splice connectors are supplied to connect the fuse holders to their respective wires. The battery positive fuse holder uses the 5 A automotive blade fuse, and the ignition trigger fuse holder uses the 1 A automotive blade fuse.

The power and ignition harness uses a pair of 16 AWG power wires to connect to the vehicle battery and a 22 AWG yellow wire to connect to an ignition-switched circuit. See Figure 2-7.

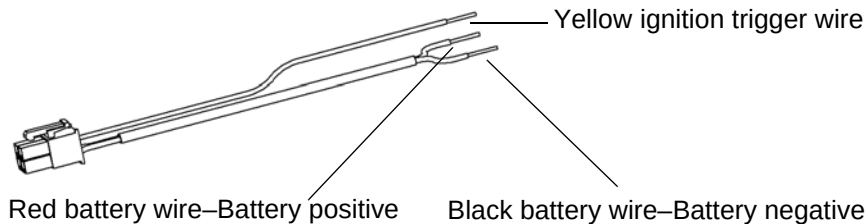


Figure 2-7 Power and ignition harness wires

To connect the power and ignition harness to the battery:

1. Connect the battery power wires as close to the battery as possible.

Important: Connecting the power farther from the battery will result in a larger voltage drop (reduced voltage from the battery to the DVR). If the voltage drop is too large, then the DVR detects the low voltage and stop recording to protect itself. If the voltage stays low for too long, the DVR interprets this as meaning the vehicle battery is drained and the DVR shuts down completely.

- The battery acts as a very good filter for transients and surges on the vehicle power lines. Also, the lines from the battery have a voltage drop across them because of current drawn by lights, blowers, and A/C units, for example.
2. If there is a master battery switch in the battery compartment connected to the battery's negative (–) terminal, then connect the black negative (–) battery power wire after the battery switch.
 3. The in-line fuse holder consists of a black plastic piece with an attached cap that simply pulls apart. Install the appropriate fuse and push the holder back together.
 4. Strip the red wire end appropriately. A butt splice connector is supplied to connect the fuse holder to the red battery power wire. Connect the other end of the fuse holder directly to the battery's positive (+) terminal.

5. Strip the yellow wire end appropriately. A butt splice connector is supplied to connect the fuse holder to the yellow wire. Connect the other end of the fuse holder to an ignition-switched circuit.
6. The other connector on the power and ignition harness is plugged into the Power In Connector on the back of the DVR.

2.7. Step 6: Installing the Smart-Link™ Module

The EX4 Plus 35 DVR uses the external Smart-Link module to provide interface connections to a variety of different signals. See Figure 2-8.

The Smart-Link is designed to be installed into the electrical compartment of a vehicle, reducing the number of cables that connect to the DVR and reducing the lengths of interface harnesses and cables that connect to the vehicle systems.

If you need assistance in determining a suitable location to mount the Smart-Link, contact Customer Service at Seon Design. (The dimensions for the Smart-Link are provided in “A.5. Smart-Link™ Module” on page A-4.)

To install the Smart-Link module:

1. Mount the Smart-Link on a vertical surface to avoid having liquids pool on the bottom.
2. Mount the Smart-Link using the four #10 × ¾" sheet metal screws or the four #10 × ¾" self-drilling screws.
3. Plug one end of the Smart-Link-to-DVR connection harness into the POWER IN connector on the back of the DVR. The connectors on the harness are identical so either end can be plugged into either device.
4. Plug the other end of the Smart-Link-to-DVR connection harness into the POWER OUT TO DVR connector on the Smart-Link.
5. Plug the power and ignition harness (shown in Figure 2-7) into the POWER IN connector on the Smart-Link.
6. Connect the red wire to a 12 VDC battery connection. Connect the black wire to a ground connection. Connect the yellow wire to an ignition-triggered signal.

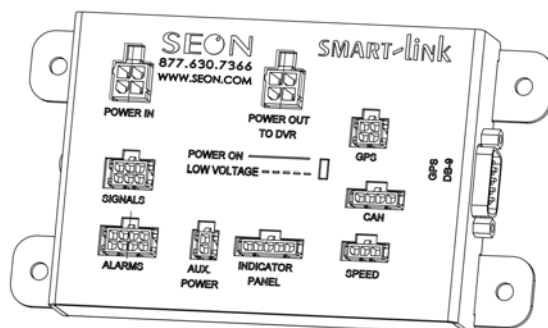


Figure 2-8 Smart-Link module



CAUTION: Power and ignition harness connection

To ensure proper performance, connect the red and black power wires to points as close to the battery as possible. Never connect the ground wire (black wire) to the vehicle chassis by drilling a hole into a panel and using a sheet metal screw. The ground connection will be corroded very quickly and the performance will be compromised.

2.7.1. Connecting the Signal Harness

The 5-conductor signal harness shown in Figure 2-9 connects to the various signals in the vehicle, including turn signals, brake lights, stop-arm, and warning lights, for example. If the signals are not being used with the system, then this harness does not have to be installed.

Always connect through a fuse-protected circuit. The signals can be activated from 12 VDC (Active HIGH) or 0 VDC (Active LOW). See “3.2.7. Using the Signals Menu” on page 3-17.

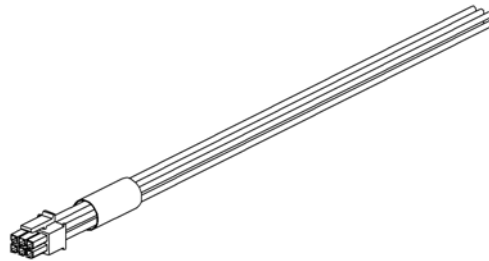


Figure 2-9 3-foot Smart-Link signal harness

The wire colors for wiring to the indicators and default text are described in Table 2-2. The indicators can be hooked up to any signal as the text for each indicator can be easily reprogrammed. For example, Indicator 2 can be connected to the Wheel Chair Lift signal, and the text could be changed from STP to WCL.

Table 2-2 Signal harness wiring

Wire Color	Indicators and Default Text
Black	Indicator 1 – LT (Left Turn Signal)
Green	Indicator 2 – STP (Stop-Arm)
Red	Indicator 3 – BRK (Brakes)
Brown	Indicator 4 – WRN (Warning Lights)
White	Indicator 5 – RT (Right Turn Signal)

To connect the signal harness connector to the Smart-Link module:

- Connect the signal harness connector to the SIGNALS connector on the Smart-Link module.

2.7.2. Connecting the Speed Cable

The 3-conductor speed sensor cable shown in Figure 2-10 is for connecting to an optional speed signal sensor or to a transmission control module (TCM).

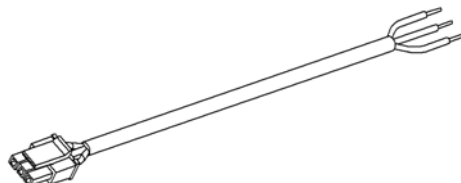


Figure 2-10 20-foot Smart-Link speed cable

Connecting to a Speed Signal Sensor The wire cables for correct wiring to the signals are described in Table 2-3. The green speed pulse signal is designed to interface to speed sensors that output a pulse signal of up to 20 VDC, 20 VAC_{p-p} or speed sensors that use open-collector style outputs. Contact Seon Design for recommended speed sensors to use with the EX4 Plus 35 System.

Table 2-3 Speed cable wiring

Wire Color	Signals
Black	Signal ground (0 V)
Green	Speed pulse signal
Red	Speed sensor power (7.5 VDC)

All of the wires in the speed sensor cable are protected against short circuits and transients. Refer to the product documentation that comes with the speed sensor for further information on connecting to an external speed sensor.

Connecting to a Transmission Control Module (TCM) The EX4 Plus 35 DVR can interface directly to some types of TCM in vehicles. Contact Seon Design for further details about connecting the speed cable to different TCMs.

To connect the speed cable to the Smart-Link module:

- Connect the speed cable connector to the SPEED connector on the Smart-Link.

2.8. Step 7: Installing the GPS Receiver

If you have not purchased a GPS receiver or if you wish to install the GPS receiver at a later time, please proceed to “2.9. Step 8: Installing the Driver’s Indicator Panel” on page 2–14.

Seon Design provides several models of GPS receivers designed to work with the EX4 Plus 35 System. Contact your sales representative at Seon Design for the GPS receiver best suited for your application.

2.9. Step 8: Installing the Driver's Indicator Panel

If you wish to install the driver's indicator panel at a later time, please proceed to "2.12. CAN Network" on page 2-16.

The EX4 Plus 35 DVR with the Smart-Link module has an interface for a driver's indicator panel. The basic version of the panel consists of a heavy duty, vandal-resistant switch with an integrated green indicator ring around the switch button. See Figure 2-11. The indicator panel has a weather-sealing gasket attached to prevent water penetration behind the device.

The indicator panel is supplied with a 12" cable and connector. A 10-foot extension cable is provided as a standard accessory with the driver's indicator panel. Extension cables of different lengths can be ordered from Seon Design. Please contact your sales representative to order a different length cable.

To install the indicator panel:

1. Drill a 3/4" hole in the desired location. Ensure that the area behind the hole is clear of obstructions before drilling.
2. Remove the mounting nut from the indicator panel.
3. If you have purchased the video recording label, install the label between the button and the dashboard.
4. Feed the connector and cable through the mounting hole.
5. Reattach the nut.

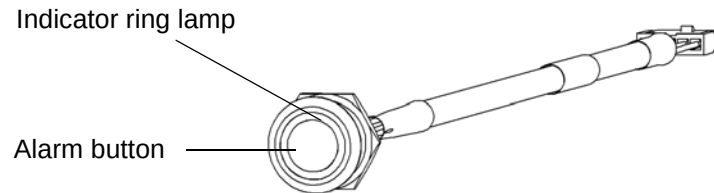


Figure 2-11 Driver's indicator panel

2.9.1 Status of the Driver's Indicator Panel

Pushing the alarm button of the driver's indicator panel causes an alarm event to be recorded by the DVR. The button corresponds to Alarm 1 on the Smart-Link alarm harness. The indicator ring indicates the status of the DVR. See Table 2-4.

Table 2-4 Driver's indicator panel status

Ring Color	Function
No green light	No power to the DVR, or ignition is not on.
Flashing green	The DVR is powered up, but not recording.
Solid green	The DVR is powered up and recording.

2.10. Step 9: Hardware Installation Final Checklist

Harnesses (Camera, recorder, and accessories)

- Check for proper slack.
- Check that the cables and harnesses are properly secured.
- Check that sharp metal edges are not touching the cables or harnesses.
- Check that all the cables and harnesses are neat and tidy.
- Check that the connections are solid (no shorts).

Cameras

- Check for tight mount.
- Check the internal harness connections.
- Check that the lid is properly seated on the gasket and secured tightly.
- Check camera (s) field of view.

Recorder

- Check for tight mounting of hardware (lock box).
- Confirm that the cable grommet is properly installed.
- Check that all connections are tight.

System

- Install the fuses.
- Plug the video monitor into the DVR.
- Power up the system.
- Confirm that all the cameras and audio sources are operating properly.
- Confirm that all the status indicators react properly.
 - Hard drive power indicator
 - Hard drive (lock and access)
 - Voltage, temperature or system alarms
- Switch to temporary power by pressing the front panel **POWER** button with vehicle ignition turned OFF.
- Test audio/video record and test audio/video playback.
- Configure the menus per the required end-user specifications.

2.11. TR-INR Inertia Sensor

The TR-INR inertia sensor is a programmable accelerometer and impact sensor that can measure rapid acceleration or deceleration, abrupt movement in bus braking or turning which can lead to complaints or injury claims. Video footage recorded with the sensor provides valuable information for reviewing incidents and for training purposes as well. The inertia sensor has adjustable trigger thresholds which can be wired to trigger alarms and signals. The unit measures 4.55" × 2.55" × 1.65" (H × W × D).

Contact your sales representative at Seon Design for TR-INR inertia sensor options.

2.12. CAN Network

The EX4 Plus 35 DVR has a built-in CAN interface for connecting to J1939 compliant vehicle networks. J1939 is a Society for Automotive Engineers (SAE) specification for network communication in a vehicle. Seon Design can factory program the Smart-Link module to accept ten signals from the large selection available on a vehicle. For more information, please contact your sales representative at Seon Design to discuss the CAN interface.

2.13. EZN Decoy System

The EZN decoy system uses a live camera that does not have to be changed from bus to bus, only the DVR must be removed. For decoy systems, the lock box and all the harness and cables are installed the same as for a live system.

2.14. Wireless Network

Contact your sales representative at Seon Design for wireless network options.

Configuring the DVR

This chapter provides information and procedures for configuring the DVR.

3.1. Configuring the DVR

The EX4 Plus 35 DVR uses on-screen configuring for easy setup of all the functions and controls. During live viewing and recording, the information displayed on the screen can include the items shown in Figure 3-1. All menus are displayed on a blue screen with white text.

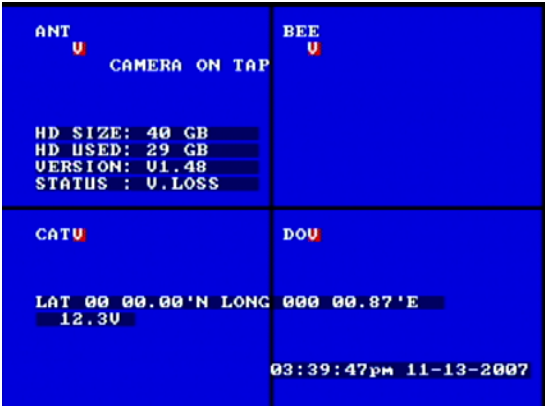


Figure 3-1 On-screen display during live viewing and recording

Table 3-1 On-screen display information

Feature	Description
CAMERA TITLES	Identifies the camera.
MAIN TITLE	Identifies the system with a unique title.
HD SIZE	The formatted size of the installed hard drive in gigabytes, GB.
HD USED	Indicates how much of the hard drive has been recorded.
VERSION	Indicates the software version of the DVR, for example V1.48.
STATUS	Indicates the operation status of the DVR. The options are: • RECORD (Normal recording) • LIVE (Live mode not recording) • TIMER (Timer recording) • ALARM (Alarm recording) • V. LOSS (Video loss or camera signal loss)
GPS Information	• LAT (Latitude) • LONG (Longitude) • SPD (Speed)
SIGNALS	Identifies the 10 different signals: • LT (Left) • STP (Stop) • BRK (Break) • WRN (Warning lights) • RT (Right) • FIVE USER-DEFINED CAN SIGNALS
Voltage	Indicates the system voltage. See page 4–13.
Time and date	Shows the time and date.

3.2. EX4 Plus 35 DVR Main Menu

The EX4 Plus 35 DVR main menu lets you set the time and date, create titles, and customize other menu items.

To view the main menu:

1. If the DVR is recording or playing, press the **STOP** button on the front of the DVR.
2. Press the **MENU** button to display the main menu. Figure 3-2 appears.
3. Turn the **JOG** wheel (inner wheel) clockwise to scroll to the next item in the menu.

OR

4. Turn the **JOG** wheel counter clockwise to scroll to the previous item.

Turning the **JOG** wheel continuously in either direction presents the menu items in a continuous loop.



Figure 3-2 Main menu

To change a setting on the main menu:

1. On the main menu, turn the **JOG** wheel to highlight the setting you want to change.
2. Press the **ENTER** button to enter the menu.
3. Turn the **JOG** wheel to change the value.
4. Press the **LOCK >** button to advance through the fields.
5. Press the **DISPLAY <** button to move back through the fields.
6. To exit the menu, press the **MENU** button.

3.2.1. Software Version

The software version in the DVR is displayed at the bottom of every menu. When contacting Seon Design about any service or operational issues, please have the software version available for Customer Service. In Figure 3-3, for example, the software version is 1.48.

3.2.2. Using the Time/Date Menu

Use the Time/Date menu to set the time format, time, date format, date, and the daylight saving time options.

To view the Time/Date menu:

1. On the main menu, turn the JOG wheel to highlight TIME/DATE.
2. Press the **ENTER** button.

The Time/Date menu appears as shown in Figure 3-3.



Figure 3-3 Time/Date menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **CLEAR** button to reload the default value into a field.
5. To exit the menu, press the **MENU** button.
6. Repeat these steps to set the Time Format, Time, Date Format, Date, Auto Daylight Saving, Start On, From, End On, and From menu items.
See Table 3-2.

3.2.2.1. Time/Date Configuration Items

Table 3-2 Time/Date configuration items

Menu Item	Description	Values	Default
TIME FORMAT	Set the time in 12-hour (am or pm indication) or 24-hour format.	12HR, 24HR	12HR
TIME	Set the time for the DVR.	12:00:00a to 11:59:59p 00:00:00 to 23:59:59	Not applicable
DATE FORMAT	Set the preferred date format.	MM/DD/YYYY, DD/MM/YYYY, YYYY/MM/DD	MM/DD/YYYY
DATE	Set the date for the DVR. The day of the week is automatically determined from the month, day, and year settings, for example, 11-16-2006 THU.	2-digit month, 2-digit day of the year, 4-digit year	MM/DD/YYYY
AUTO DAYLIGHT SAVING	The Auto Daylight Saving option set to ON automatically adjusts the internal clock to daylight saving time. Beginning in 2007, on the second Sunday in March, the time springs forward from 2:00:00 am to 3:00:00 am. On the first Sunday in November, the time falls back to Standard Time by changing from 2:00:00 am to 1:00:00 am. The times and dates can be adjusted as required.	ON, OFF	ON
START ON	Set the month and week of the month for daylight saving to start. For example MAR 2nd SU.	JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC 1ST, 2ND, 3RD, 4TH, LAST SUN, MON, TUE, WED, THU, FRI, SAT	MAR 2ND SUN
FROM	Set the time for daylight saving to start.	12:00:00a to 11:59:59p 00:00:00 to 23:59:59	02:00a TO 03:00A
END ON	Set the month and week of the month for daylight saving to end, for example, NOV 1st SU.	JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC 1ST, 2ND, 3RD, 4TH, LAST SUN, MON, TUE, WED, THU, FRI, SAT	NOV 1ST SUN
FROM	Set the time for daylight saving to end.	12:00:00a to 11:59:59p 00:00:00 to 23:59:59	02:00a TO 01:00a

3.2.3. Using the Titles/Display Menu

Use the Titles/Display menu to set the on-screen title and other on-screen options.

To view the Titles/Display menu:

1. On the main menu, turn the JOG wheel to highlight TITLES/DISPLAY.
2. Press the **ENTER** button.

The Titles/Display menu appears as shown in Figure 3-4.



Figure 3-4 Titles/Display menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **CLEAR** button to reload the default value into a field.
5. To exit the menu, press the **MENU** button.
6. Repeat these steps to set the Main Title, Main Title Display, Camera 1 to Camera 4, and Voltage Display. See Table 3-3.

3.2.3.1. Titles/Display Configuration Items

Table 3-3 Titles/Display configuration items

Menu Item	Description	Values	Default
MAIN TITLE	The main title is displayed on every view and can be up to 24 characters long.	• A to Z • 0 to 9 • and • . (Period) • , (Comma) • + (Plus) • – (Dash) • / (Forward slash) • _ (Space)	Not applicable.
MAIN TITLE DISPLAY	Set the main title display to ON or OFF.	ON, OFF	ON
CAMERA 1	The individual cameras can have titles up to 10 characters long.	• A to Z • 0 to 9 • and • . (Period) • , (Comma) • + (Plus) • – (Dash) • / (Forward slash) • _ (Space)	1
CAMERA 2			2
CAMERA 3			3
CAMERA 4			4
VOLTAGE DISPLAY	Displays the system input voltage for diagnosing any potential problems with the system.	ON, OFF	ON

3.2.4. Using the Record Menu

Use the Record menu to set the resolution, camera speed in frames per second (FPS), the image quality, the Record Delay-On and Record Delay-Off times, and other general recording options.

To view the Titles/Display menu:

1. On the main menu, turn the JOG wheel to highlight RECORD.
2. Press the ENTER button.

The Record menu appears as shown in Figure 3-5.



Figure 3-5 Record menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the LOCK > button to advance through the fields.
3. Press the DISPLAY < button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the CLEAR button to reload the default value into a field.
5. To exit the menu, press the MENU button.
6. Repeat these steps to set the Resolution, Camera 1 to Camera 4 Speed and Quality, Record Audio, Repeat Record, Record Delay-On Time, Record Delay-Off Time, and Power Delay-Off Time. See Table 3-4.

3.2.4.1. Record Configuration Items

Table 3-4 Record configuration items

Menu Item	Description	Values	Default
RESOLUTION	The recording resolution can be set to one of three different levels. A higher recording resolution means a shorter recording time on a hard drive. (See Table 3-6, Table 3-7, or Table 3-8.) The recording resolution is a global setting and affects all the cameras and the alarm settings.	720×480	720×240
		720×240	
		360×240	
CAMERA 1 TO CAMERA 4 SPEED	The camera speed can be set differently for each camera. Maximum aggregate speed of 30 FPS at 720×480 resolution across all four channels. For example, 7.5 FPS for four cameras ($7.5 \text{ FPS} \times 4 = 30 \text{ FPS}$).	10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	7.5 FPS
	Maximum aggregate speed of 60 FPS at 720×240 resolution across all four channels. For example, 15 FPS for four cameras ($15 \text{ FPS} \times 4 = 60 \text{ FPS}$).	20 FPS, 15 FPS, 10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	
	Maximum aggregate speed of 120 FPS at 360×240 resolution across all four channels. For example, 30 FPS for four cameras ($30 \text{ FPS} \times 4 = 120 \text{ FPS}$).	30 FPS, 20 FPS, 15 FPS, 10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	
CAMERA 1 TO CAMERA 4 QUALITY	The EX4 Plus 35 DVR uses MPEG-4 video compression to extend the recording time on the hard drive. The Quality option lets you choose the amount a picture is compressed versus the amount of memory the picture takes up on the hard drive. A higher picture quality (6) means lower compression and therefore a higher memory requirement. A lower picture quality (1) means higher compression.	Picture Quality • 1 (Standard) • 2 • 3 • 4 • 5 • 6 (High)	4
RECORD AUDIO	By turning Record Audio to OFF, no signal is recorded from the audio inputs. This feature is useful if no microphones are being used as hard drive memory space is not used to record unnecessary audio channels. At slow record speeds, this can amount to a considerable savings.	ON, OFF	ON

Table 3-4 Record configuration items

Menu Item	Description	Values	Default
REPEAT RECORD	By turning Repeat Record to ON, you can choose to start recording again and overwrite the information on the hard drive. By turning Repeat Record to OFF, you can choose to stop recording and retain all the information on the hard drive.	ON, OFF Note: If Repeat Record is OFF and the hard drive has been filled, the DVR can be made to start recording again by pressing the REC button on the DVR front panel for five seconds.	ON
RECORD DELAY-ON TIME	Record Delay-On time determines when the system starts up. The Delay-On options uses Smart-Start™ which protects the DVR from transients and voltage swings during vehicle startup. Note: After power up, the DVR may take up to 80 seconds to start recording as it performs a thorough self-test.	0, 15 SEC, 30 SEC, 1 MIN, 2 MIN, 3 MIN, 4 MIN, 5 MIN, 10 MIN, 15 MIN, 20 MIN, 30 MIN, 45 MIN, and 60 MIN.	30 SEC
RECORD DELAY-OFF TIME	Record Delay-Off time enables the DVR to continue recording after the driver has turned off the vehicle ignition.	0 (disables Record Delay-off), 15 SEC, 30 SEC, 1 MIN, 2 MIN, 3 MIN, 4 MIN, 5 MIN, 10 MIN, 15 MIN, 20 MIN, 30 MIN, 45 MIN, and 60 MIN.	30 SEC
POWER DELAY-OFF TIME	Power Delay-Off time keeps power and control signal to the DVR after the vehicle ignition is turned off to allow a remote connection to access the DVR's video.	0 MIN to 255 MIN in five minute increments.	5 minutes

3.2.4.2. Recording Capacity

The EX4 Plus 35 DVR uses MPEG-4 video compression to extend the recording time on the hard drive. The recording time varies, depending on the settings for frames per second (speed), resolution, and picture quality.

The picture quality option lets you determine the amount a picture is compressed versus the amount of memory the picture takes up on the hard drive. Table 3-5 shows the picture quality settings where setting 1 is the standard quality and setting 6 provides the highest picture quality. A higher picture quality (6) means lower compression and a higher memory requirement. A lower picture quality (1) means higher compression and a lower memory requirement.

Table 3-5 Picture quality settings

Setting	Picture quality
1-STD	Standard
2	
3	
4	
5	
6-HIGH	Highest

The following tables show the estimated recording time in hours for an 80 GB, 500 GB, and 750 GB hard drive with **one camera** at the different settings for frames per second (FPS), resolution, and picture quality.

If all the cameras are configured to record at the same resolution, frame rate and picture quality, you can calculate the system recording capacity by dividing the value in the table by the number of cameras. If the cameras are set to record at different rates, contact Seon Design for assistance in calculating the recording capacity.

The EX4 Plus 35 DVR processes 4 different video inputs simultaneously—the frames per second (FPS) is aggregate based on the sum of all the camera frame rates. In other words, the recording times shown in the following tables are independent of how many cameras are connected to the DVR.

Important: The amount of memory the hard drive uses is dependent on the scene content and the lighting conditions. Your actual recording times may vary.

Table 3-6 Estimated recording time in hours with 80 GB hard drive

Frames per second (FPS)	Picture Quality and Resolution								
	2 360×240	4 360×240	6 360×240	2 720×240	4 720×240	6 720×240	2 720×480	4 720×480	6 720×480
30	176	135	84	110	84	52	70	49	22
20	219	159	110	135	103	67	70	49	22
15	255	224	138	179	138	90	105	78	38
10	293	251	160	195	160	104	147	110	52
7.5	317	238	173	212	159	127	159	112	60
6	349	291	195	219	194	134	159	135	63
5	393	328	246	281	246	179	219	164	90
4	475	380	317	380	271	211	238	190	100
3	683	513	410	512	410	293	343	257	138
2	992	747	560	747	560	450	561	374	225
1	1698	1280	848	1277	855	686	855	636	425

Table 3-7 Estimated recording time in hours with 500 GB hard drive

Frames per second (FPS)	Picture Quality and Resolution								
	2 360×240	4 360×240	6 360×240	2 720×240	4 720×240	6 720×240	2 720×480	4 720×480	6 720×480
30	1100	844	525	688	525	325	438	306	138
20	1369	994	688	844	644	419	438	306	138
15	1594	1400	863	1119	862	563	656	488	238
10	1831	1569	1000	1219	1000	650	919	688	325
7.5	1981	1488	1081	1325	994	794	994	700	375
6	2181	1819	1219	1369	1213	838	994	844	394
5	2456	2050	1538	1756	1538	1119	1369	1025	563
4	2969	2375	1981	2375	1694	1319	1488	1188	625
3	4269	3206	2563	3200	2563	1831	2144	1606	863
2	6200	4669	3500	4669	3500	2813	3506	2338	1406
1	10613	8000	5300	7981	5344	4288	5348	3975	2656

Table 3-8 Estimated recording time in hours with 750 GB hard drive

Frames per second (FPS)	Picture Quality and Resolution								
	2 360×240	4 360×240	6 360×240	2 720×240	4 720×240	6 720×240	2 720×480	4 720×480	6 720×480
30	1650	1266	788	1032	788	488	657	459	207
20	2054	1491	1032	1266	966	629	657	459	207
15	2391	2100	1295	1679	1293	845	984	732	357
10	2747	2354	1500	1829	1500	975	1379	1032	488
7.5	2972	2232	1622	1988	1491	1191	1491	1050	563
6	3272	2729	1829	2054	1820	1257	1491	1266	591
5	3684	3075	2307	2634	2307	1679	2054	1538	845
4	4454	3563	2972	3563	2541	1979	2232	1782	938
3	6404	4809	3845	4800	3845	2747	3216	2409	1295
2	9300	7004	5250	7004	5250	4220	5259	3507	2109
1	15920	12000	7950	11972	8016	6432	8022	5963	3984

3.2.5. Using the Alarms Menu

Use the Alarms menu to set the options and events that occur when an external alarm is received by the DVR. Usually, a driver-activated switch or other external device causes the alarm.

To view the Alarms menu:

1. On the main menu, turn the JOG wheel to highlight ALARMS.
2. Press the **ENTER** button.

The Alarms menu appears as shown in Figure 3-6.



Figure 3-6 Alarms menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.

The selected menu item is highlighted with a pale blue background.

4. Press the **CLEAR** button to reload the default value into a field.
 5. To enter the Alarm 1 Settings to Alarm 4 Settings, press the **ENTER** button.
- The Alarm 1 setting menu appears as shown in Figure 3-7.



Figure 3-7 Alarm settings sub-menu

6. Repeat these steps to set the Alarm Input, Alarm Duration, Camera Speed and Quality. See Table 3-9 and Table 3-10.
7. To exit the menu, press the **MENU** button.

Table 3-9 Alarm configuration items

Menu Item	Description	Values	Default
ALARMS	ON allows the Alarm input options to control the individual alarms. OFF disables all alarms, regardless of the settings of the alarm input options.	ON, OFF	ON
ALARM INPUT 1	Alarm input controls the four individual alarms.	ON, OFF	ON
ALARM INPUT 2			ON
ALARM INPUT 3			OFF
ALARM INPUT 4			OFF
ALARM 1 SETTINGS to ALARM 4 SETTINGS	Lets you set the individual settings duration for the four alarm inputs.	Presents an alarm sub-menu.	Not applicable

Table 3-10 Alarm 1 settings configuration items

Menu Item	Description	Values	Default
ALARM INPUT	Alarm input option refers to the type of contact closure required to activate an alarm. All of the alarm inputs are activated by a change reference to signal ground.	N.O. (normally open) would activate an alarm when connected to ground. N.C. (normally closed) would normally be connected to ground and then opened to trigger an alarm.	N.O.
ALARM DURATION	The alarm duration time is the length of time after an alarm has been received that the video is recorded at the alarm speed and quality. The alarm duration is also used as a data pointer for data access.	0, 5 SEC, 10 SEC, 15 SEC, 30 SEC, 1 MIN, 2 MIN, 3 MIN, 4 MIN, 5 MIN, 10 MIN, 15 MIN, 20 MIN, 30 MIN, 45 MIN, 60 MIN and NON-STOP Note: The 0 option is for using the alarm event as a searchable item only.	5 SEC
PRE-ALARM RECORD	Not applicable.	Not applicable.	ON

Table 3-10 Alarm 1 settings configuration items

Menu Item	Description	Values	Default
CAMERA 1 to CAMERA 4 SPEED	A DVR usually records in a mode that conserves hard drive space, but increases the speed and quality for a short duration to record the alarm event. Note: Setting a camera speed to OFF causes a camera to not be recorded during an alarm. This allows other cameras to be recorded at a higher speed.		30 FPS (CAMERA 1)
	Aggregate 30 FPS at 720×480 resolution across all four channels.	10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	OFF (CAMERA 2, 3, 4)
	Aggregate 60 FPS at 720×240 resolution across all four channels. For example, 15 FPS for four cameras (15 FPS × 4 = 60 FPS).	20 FPS, 15 FPS, 10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	
	Aggregate 120 FPS at 360×240 resolution across all four channels. For example, 30 FPS for four cameras (30 FPS × 4 = 120 FPS).	30 FPS, 20 FPS, 15 FPS, 10 FPS, 7.5 FPS, 6 FPS, 5 FPS, 4 FPS, 3 FPS, 2 FPS, 1 FPS, OFF	
CAMERA 1 to CAMERA 4 QUALITY	The EX4 Plus 35 DVR uses MPEG-4 video compression to extend the recording time on the hard drive. The picture quality option lets you trade off the amount a picture is compressed versus the amount of memory the picture takes up on the hard drive. A higher picture quality (6) means lower compression and therefore a higher memory requirement. A lower picture quality (1) means higher compression. See Table 3-5, “Picture quality settings” on page 3-10.	Picture Quality • 1 (Standard) • 2 • 3 • 4 • 5 • 6 (High)	6 (High)

3.2.6. Using the Timers Menu

Use the Timers menu to change the timer schedules to meet different bus route requirements.

To view the Timers menu:

1. On the main menu, turn the JOG wheel to highlight TIMERS.
2. Press the ENTER button.

The Timers menu appears as shown in Figure 3-8.

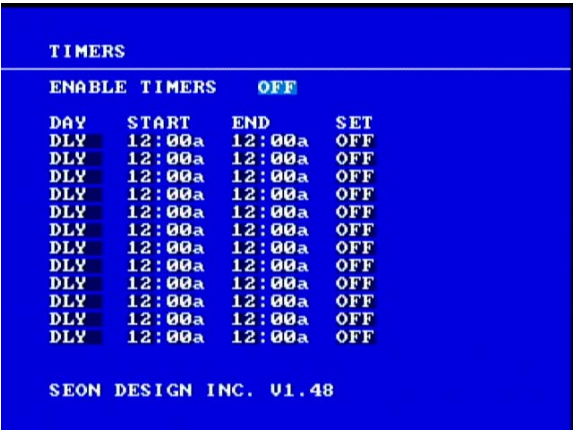


Figure 3-8 Timers menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **CLEAR** button to reload the default value into a field.
5. To exit the menu, press the **MENU** button.
6. Repeat these steps to set the Enable timers, Day, Start, End, and Set. See Table 3-11.

Table 3-11 Timers configuration items

Menu Item	Description	Values	Default
ENABLE TIMERS	Records at preset times during the day. The vehicle ignition must be turned on for the timers to work. Note: If the Timers are enabled and all the individual timers are set to OFF, the DVR will not start recording. Either turn on an individual timer or set Enable Timers to OFF. Record Delay-On settings are overridden by the timers, except for the first 30 seconds. If the system is recording during a Timer interval, then Record Delay-Off settings overrides the timer once the vehicle ignition is turned off.	ON, OFF (When turned on, the DVR will not record unless a timer has been turned on.)	OFF

Table 3-11 Timers configuration items

Menu Item	Description	Values	Default
DAY	Set the timer to record every day, daily, every weekday, or only on the weekend.	- SUN (Sunday) - MON (Monday) - TUE (Tuesday) - WED (Wednesday) - THU (Thursday) - FRI (Friday) - SAT (Saturday) - DLY (Daily) - WDAY (Weekday) - WKEND (Weekend)	DLY
START	Set in 12-hour or 24-hour format in the TIME/DATE menu. Avoid overlapping the Start and End time.	12:00:00a to 11:59:59p 00:00:00 to 23:59:59	12:00a
END	Set in 12-hour or 24-hour format.	12:00:00a to 11:59:59p 00:00:00 to 23:59:59	12:00a
SET	Set the individual timer to ON or OFF.	ON, OFF	OFF

3.2.7. Using the Signals Menu

The EX4 Plus 35 DVR using the Smart-Link module has the ability to record various signals from the vehicle. For example, when the brakes are applied, the text BRK can be recorded on the camera picture. Use the Signals menu to configure ten different character strings to be displayed when an external analog signal or CAN message has been sent.

To view the Signals menu:

1. On the main menu, turn the JOG wheel to highlight SIGNALS.
2. Press the ENTER button.

The Signals menu appears as shown in Figure 3-9.

**Figure 3-9** Signals menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK** > button to advance through the fields.
3. Press the **DISPLAY** < button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **CLEAR** button to reload the default value into a field.
5. To exit the menu, press the **MENU** button.
6. Repeat these steps to set the Label and Level. See Table 3-12.

Table 3-12 Signal configuration items

Menu Item	Description	Values	Default
LABEL (1)		LT (Left)	LT
2		STP (Stop)	STP
3		BRK (Brake)	BRK
4		WRN (Warning lights)	WRN
5		RT (Right)	RT
6–10	Signals 6 to 10 are CAN signals and are defined by the user. See “2.12. CAN Network” on page 2–16.		No default.
LEVEL	Indicates the activation level for the signal. • If ACTIVE HIGH is selected, 12 VDC applied to a signal causes the text to be displayed. • If ACTIVE LOW is selected, 0 VDC applied to a signal causes the text to be displayed. • If CAN is selected, a CAN network message causes the signal to be activated.	ACTIVE HIGH, ACTIVE LOW OR CAN	ACTIVE HIGH

3.2.8. Using the GPS/Speed Menu

The EX4 Plus 35 DVR can display and record:

- GPS data from an external GPS receiver
- Vehicle speed from several different sources.

To view the GPS/Speed menu:

1. On the main menu, turn the JOG wheel to highlight GPS/SPEED.
2. Press the **ENTER** button.

The GPS/SPEED menu appears as shown in Figure 3-10.



Figure 3-10 GPS/Speed menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.

The selected menu item is highlighted with a pale blue background.

4. Press the **CLEAR** button to reload the default value into a field.
5. Exit the menu, press the **MENU** button.
6. Repeat these steps to set the GPS Display, GPS Time, UTC Time Ref, Speed Display, Speed Unit, Speed Pulse Count, and Calibrate Speed.
See Table 3-13.

Table 3-13 GPS/SPEED configuration items

Menu Item	Description	Values	Default
GPS DISPLAY	When GPS DISPLAY is ON and a GPS receiver is connected to the DVR, the latitude and longitude of the vehicle location are displayed on the screen.	ON, OFF	OFF
GPS TIME	A very accurate time source is embedded in the GPS satellite signal. Set the GPS TIME to ON to synchronize the DVR's internal clock to the GPS satellite time. Because the GPS satellites do not know where the GPS receiver is, the GPS signal sends Universal time, or UTC time (also known as Universal Time Coordinated.)	ON, OFF	OFF
UTC TIME REF	UTC is referenced to the atomic clock standard in Greenwich, England. The DVR location is a certain time difference from UTC time. For example, Eastern Standard Time is –5 hours from UTC time. Pacific Standard Time is –8 hours from UTC time. To use GPS time, determine your time difference from UTC time and enter this time into the DVR. Use the time reference to standard time. The DVR keeps track of the Daylight Saving Time changes internally (if auto daylight saving is set to on).	–12 to + 12 in one-hour increments	–5
SPEED DISPLAY	If speed is not being recorded, change the speed display option to OFF. This turns off the 0 on the display which indicates zero speed. If speed is being recorded, there are three sources that the DVR can use to obtain vehicle speed: • a pulse counting input • a GPS receiver • vehicle CAN network. Set the speed display option to the desired input type. All of the speed input devices are optional. Contact your sales representative at Seon Design to obtain the optimal speed solution.	OFF, PULSE, GPS, CAN	OFF
SPEED UNIT	If Speed is being recorded from the GPS receiver or the CAN network, then the desired speed display units must be selected. Selecting the speed unit to be MPH makes the DVR convert the GPS signal to display speed in miles per hour. If the speed display is set to pulse, the speed unit does not matter as the calibration routine automatically sets the unit.	MPH, KPH, KTS (knots)	MPH

Table 3-13 GPS/SPEED configuration items

Menu Item	Description	Values	Default
SPEED PULSE COUNT	The EX4 Plus 35 DVR can record vehicle speed by counting the number of pulses received either from a vehicle speed sensor or a vehicle Transmission Control Module (TCM). The DVR must first be calibrated to the vehicle's speed signal by driving for one mile (kilometer) in Calibration Mode. The DVR counts the pulses from the vehicle's speed sensor and then converts a pulse rate into speed. The actual distance driven during calibration determines the unit of the speed. For example, driving one mile during calibration results in speed being in MPH. Driving one kilometer results in KPH. The SPEED PULSE COUNT increments as the vehicle travels.	2500 to 150,000	003000
CALIBRATE SPEED	When calibrating speed, it is best to use known road markers to determine a mile (kilometer) as reading the odometer may introduce errors.	Not applicable	Not applicable

To calibrate speed:

1. Press the **POWER** button only once to begin calibration.

It takes approximately two seconds for the system to be ready to start calibration. After driving one mile, the SPEED PULSE COUNT may be anywhere from 2500 to 150,000, depending on the type of vehicle speed sensor being used.

2. Press the **POWER** button again to save the calibration value.

The DVR returns to the GPS/Speed menu and the new calibrated speed pulse count is shown.

Important: You can change the speed pulse count to either fine tune the speed display, or to set a known value from a similar vehicle. This is useful if a fleet consists of several models of the same bus. By calibrating one bus, the speed pulse count can then be entered into the DVRs for all of the similar buses. However, if a DVR is moved from one bus to another, the speed may have to be recalibrated due to differences in transmissions, tires, and other factors.

3.2.9. Using the Network Menu

The EX4 Plus 35 DVR has a built-in network interface for connecting to an office network or to certain peripheral devices.

Use the Network menu to set the communication parameters necessary to use the Ethernet connection on the EX4 Plus 35 DVR. Using the Network connection in the DVR requires specific knowledge to which the DVR is being connected. A qualified IT administrator is required to provide information about the network and assist in configuring the Network menu.

To view the Network menu:

1. On the main menu, turn the JOG wheel to highlight NETWORK.
2. Press the ENTER button.

The NETWORK menu appears as shown in Figure 3-11.



Figure 3-11 Network menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the LOCK > button to advance through the fields.
3. Press the DISPLAY < button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the CLEAR button to reload the default value into a field.
5. To exit the menu, press the MENU button.
6. Repeat these steps to set the menu items. See Table 3-14.

Table 3-14 Network configuration items

Menu Item	Description	Values	Default
DHCP	If a DHCP server is being used, select ON. To assign specific network parameters for IP Address, Subnet Mask, Default Gateway, and DNS Server, set the DHCP option to OFF.	ON, OFF	ON
IP ADDRESS	For the IP address, enter a static IP address for the DVR. Make sure this address is not used by any other device on the network. If there is a DHCP server on the network, make sure the DVR IP address is not in the IP address range assigned by the DHCP server.		192.168.010.248
SUBNET MASK	Enter the subnet mask for the network (usually 255.255.255.0).		255.255.255.000
DEFAULT GATEWAY	Enter the IP address of the router or gateway on the LAN.		192.168.010.001
DNS SERVER	Enters the IP address of the DNS server on the network.		192.168.010.168
MAC ADDR	The MAC address is fixed in the DVR and corresponds to the unique ID of the internal Ethernet controller.		Not configurable
USER NAME	Six different user names can be assigned access to the DVR over a network. The user names are programmable.		
	User 1		Name: ADMIN Password: 11111111 Level: PLAY
	Users 2 to 4		Name: USER <i>n</i> Password: <i>nnnnnnnn</i> Level: PLAY
	Users 5 to 6		Name: USER <i>n</i> Password: <i>nnnnnnnn</i> Level: LIVE
LEVEL	There are two levels of network access for the DVR: PLAY and LIVE.	PLAY: view recorded video on the DVR. LIVE: view only what the DVR is recording.	• 1 PLAY • 2 PLAY • 2 PLAY • 4 PLAY • 5 LIVE • 6 LIVE

3.2.10. Using the System Menu

The System menu allows control of system level settings and functions that should only be accessed by authorized individuals.

To view the System menu:

1. On the main menu, turn the JOG wheel to highlight SYSTEM.
2. Press the **ENTER** button.

The SYSTEM menu appears as shown in Figure 3-12.



Figure 3-12 System menu

To change a setting on the sub-menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **CLEAR** button to reload the default value into a field.
5. To exit the menu, press the **MENU** button.
6. Repeat these steps to set the sub-menu items. See Table 3-15.

Table 3-15 System configuration items

Menu Item	Description	Values	Default
ONE-TOUCH DOWNLOAD	Use the ONE-TOUCH button without a video monitor. See “4.5.2. USING THE ONE-TOUCH DOWNLOAD OPTION” ON PAGE 4–7.	- ALARMS downloads alarm events only, starting with the latest segment and working backwards. - TODAY downloads as much information from today as possible, starting with the latest segment and working backwards. - TIME downloads as much information as possible onto the external device, starting with the latest segment and working backwards.	ALARMS
ALARM BUZZER	Set to ON, the buzzer sounds when an external alarm is received.	ON, OFF	OFF
VIDEO LOSS BUZZER	Set to ON, the buzzer sounds for 30 seconds if a camera signal goes away while the DVR is operating.	ON, OFF	OFF
DISK FULL BUZZER	Set to ON, the buzzer sounds if the REPEAT RECORD option is set to OFF and the hard drive is full.	ON, OFF	OFF
WATERMARK VIDEO	Set to ON, an undetectable code is embedded into the video that can only be seen using a special viewing application.	ON, OFF	OFF
PASSWORD ENABLE	Set to ON, the front keypad is locked out and requires a password. Enter the password while pressing the FULL button. To use this function, see “4.5.6. Using the LOCK Button” on page 4–12.	ON, OFF	OFF
SET PASSWORD	The password is 8 characters.	Uses the numbers 0 1 2 3 4 5 6 7 8.	88888888
LOAD DEFAULTS	Three sets of default settings are available that can be changed by the user.	MEM1, MEM2, MEM3, SEON (factory default)	Not applicable
SET DEFAULTS	Three sets of default settings can be changed and saved in the Set Defaults menu. This means you can call up different programming features based on the use of the vehicle.	MEM1, MEM2, MEM3	Not applicable

Table 3-15 System configuration items

Menu Item	Description	Values	Default
IMPORT DEFAULTS	A set of defaults can be imported from a USB storage device. The settings on the USB are saved from another EX4 Plus 35 DVR (see Export Defaults). This is a useful feature if several buses in a fleet are to be programmed all the same.	CURRENT, MEM1, MEM2, MEM3	Not applicable
EXPORT DEFAULTS	The defaults programmed into the DVR can be saved to an external USB memory device. If there are several vehicles in the fleet that are all programmed the same, then the defaults can be set up on one bus, exported using the Export Defaults feature, and then imported on the other DVRs using the Import Defaults option. (Note: The DVR password is not exported with the defaults.)	CURRENT, MEM1, MEM2, MEM3	Not applicable
PROGRAM UPDATE	The software can be upgraded in the field as new features are added. The Program update option makes the DVR read the new software from the USB memory device and reprogram itself.		Not applicable
FORMAT HARD DRIVE	Reformats the data hard drive and makes all the previous data inaccessible (not actually erased).	DRIVE 1 on EX4 Plus 35 DVR (On the newer software, there is no reference to drive 1.)	DRIVE 1

3.2.11. Updating the Software Program

The software update must be obtained from Seon Design. Attempting to load other software will not work on the EX4 Plus 35 DVR.

Updating the software program on the DVR involves the following steps:

- Insert a USB memory device with new software into the USB port.
- Back up your currently used settings (Export Defaults).
- Run the program update (Program Update) and restart the DVR.
- Load the default settings (Load Defaults) and restart the DVR.
- Load the previously saved settings (Import Defaults).
- Format the hard drive (Format Hard-drive).

3.2.11.1. Beginning the Software Update

To install a software update, a USB memory device must be formatted from a Windows computer using the FAT file format. Load the Program Update file onto the USB memory device.

To install a software program update to the EX4 Plus 35 DVR:

1. Make sure the DVR is powered off.
2. Unlock and remove the hard drive.
3. Power up the DVR using the vehicle ignition.

Important: Do not use temporary power mode to power up the DVR for a program update.

4. Insert the USB memory device with the new software version into the USB port on the front of the DVR.
5. After the DVR has restarted, press the **MENU** button.

3.2.11.2. Backing up Your Currently Used Settings

This process saves your current DVR settings to the USB memory device. The settings will be reloaded later.

To back up your currently used settings:

1. Turn the JOG wheel to select **SYSTEM** and press the **ENTER** button.
2. Press the **LOCK >** button to select **EXPORT DEFAULTS** and press the **ENTER** button.

The Export Defaults popup menu appears, as shown in Figure 3-13.



Figure 3-13 Export defaults popup menu

3. Turn the JOG wheel to select **CURRENT** to export the currently used settings.
 4. Press the **ENTER** button to export.
 5. The screen displays, "UPLOAD....." and then "SUCCESS".
- OR
- Press the **MENU** button to exit.

3.2.11.3. Running the Program Update

This step loads the new software onto the EX4 Plus 35 DVR.

To run the program update:

Important: Ensure the vehicle ignition is turned on. If power goes away in PHASE3, the DVR will be corrupt.

1. Select Program Update in the System menu and press the **ENTER** button.
The Program Update popup menu appears, as shown in Figure 3-14.



Figure 3-14 Program update popup menu

2. Press the **ENTER** button.
The screen displays “PHASE1/3...” for approximately 20 seconds as it reads the information from the USB memory device.
The screen displays “PHASE2/3...” for approximately 15 seconds as the new program is verified.
The DVR reprograms itself and displays “PHASE3/3...” for approximately 90 seconds.
After the DVR has reprogrammed itself, the menu goes back to the SYSTEM menu, and “SUCCESS PLEASE REBOOT” is displayed at the bottom of the screen.
3. Remove the USB memory device.
4. Power the DVR off and restart it to finish loading the new software.

3.2.11.4. Loading the Default Settings

This step loads the default settings for the DVR to ensure that all of the new functions have been completely initialized.

To load the default settings:

1. Once the DVR powers up, press the **MENU** button.
2. Turn the JOG wheel to highlight SYSTEM and press the **ENTER** button.
3. In the LOAD DEFAULTS menu, press the **ENTER** button.

The Load Defaults popup menu appears, as shown in Figure 3-15.

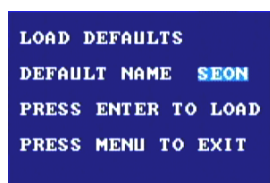


Figure 3-15 Load defaults popup menu

4. Turn the JOG wheel to select SEON.
Selecting SEON loads Seon factory options.
5. Press the **ENTER** button to load the default settings.
The screen displays, “LOAD.....” then “SUCCESS”.
OR
Press the **MENU** button to exit the process.
6. Press the **MENU** button twice to exit out of the main menu.
7. Power the DVR off and restart it.

3.2.11.5. Loading the Previously Saved Settings

This step loads the previous settings saved to the USB memory device onto the DVR.

To load the previously saved settings:

1. Insert the USB memory device.
2. Press the **MENU** button.
3. Turn the JOG wheel to highlight SYSTEM and press the **ENTER** button.
4. In the IMPORT DEFAULTS menu, press the **ENTER** button.

The Import Defaults popup menu appears, as shown in Figure 3-16.

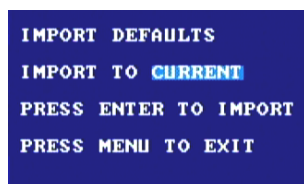


Figure 3-16 Import defaults popup menu

5. Turn the JOG wheel to select CURRENT to export the currently used settings.
6. Press the **ENTER** button to import.
The screen displays, “LOAD.....” then “SUCCESS”.
OR
Press the **MENU** button to exit the process.
7. Press the **MENU** button twice to exit out of the main menu.

3.2.11.6. Formatting the Hard Drive

Important: The hard drives supplied by Seon Design are pre-formatted to work in the EX4 Plus 35 DVR.

Before formatting an existing hard drive, you may wish to create an archive file using the HD Reader. For more information, see the *HD Reader User's Guide*, document part number 700-0036.

If a new hard drive is being used in the EX4 Plus 35 DVR, it should first be reformatted. Any new hard drive that is incompatible formats automatically.

To format the hard drive:

1. Make sure a hard drive is installed and locked.
2. If necessary, press the **STOP** button to stop recording.
Wait five seconds for the DVR to stop recording and the **REC** button is not illuminated.
3. Press the **MENU** button.
4. Turn the JOG wheel to select the System menu, and press the **ENTER** button.
5. Press the **LOCK >** button to select Format Hard-Drive.
6. Press the **ENTER** button.

The Format Hard-Drive menu appears as shown in Figure 3-17.

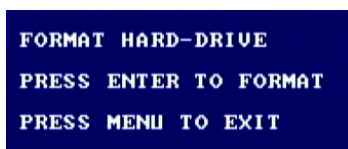


Figure 3-17 Format hard-drive popup menu

OR

Press the **MENU** button to exit the process.

7. Press the **ENTER** button to begin formatting the hard drive.
The screen displays the message, "FORMATTING." and then "SUCCESS."
8. Press the **MENU** button twice to return to the camera view.
The DVR should start recording.

CHAPTER 4

Operating the DVR

This chapter provides information and procedures for operating the DVR.

4.1. Operating and Monitoring the DVR

The EX4 Plus 35 DVR front panel provides several features which are used to operate and monitor the status of the DVR: DVR buttons, connectors, status indicator light, SHUTTLE/JOG wheel. During normal operation of the DVR, any of the indicator lights may be illuminated to show the status of the unit.

Chapter 1, “Introduction” provides an overview of the front panel features. See Figure 1-1 on page 1–3 for an illustration of the front panel. See also Table 1-1 on page 1–3 for a description of the functional features.

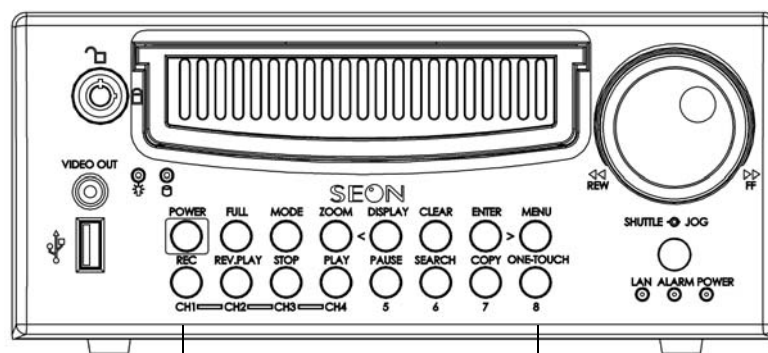
4.1.1 Using the DVR buttons

The DVR buttons are multi-function buttons. When the DVR buttons are activated, the red LED in the centre of the button is illuminated.

Use the DVR buttons to:

- Power up the unit without turning the vehicle ignition on.
- Enter the menu mode to configure the DVR.
- Play back, stop and pause.
- Search for desired information.
- Copy information to a USB memory device.

Use the SHUTTLE/JOG wheel to control the video playback.



Front panel DVR buttons

Figure 4-1 Front panel DVR buttons

Table 4-1 Using the DVR buttons

Button	Description
POWER	With the vehicle ignition turned OFF and the DVR powered off, press the POWER button for 3 seconds to power up the DVR. Recording is not initiated. With the vehicle ignition turned OFF and the DVR still powered up in the RECORD DELAY-OFF interval, press the POWER button for 5 seconds to power down the DVR immediately. (Record Delay-Off Time enables the DVR to continue recording after the driver has turned off the vehicle ignition. Record Delay-Off Time can be disabled or adjusted. See “3.2.4. Using the Record Menu” on page 3–8.) With the vehicle ignition turned ON, press the POWER button for 5 seconds during the RECORD DELAY-ON interval to power up the DVR and start recording. (Record Delay-On Time determines when the EX4 Plus 35 System starts up. Record Delay-On Time can be adjusted. See “3.2.4. Using the Record Menu” on page 3–8.)
FULL	Press the FULL button in combination with one of the four camera buttons (CH1, CH2, CH3, or CH4), and the DVR displays the selected camera in full screen display mode. If no camera is plugged in, a blue screen is displayed. Exit full screen display mode by pressing the MODE button.
MODE	Press the MODE button to change the viewing display.
ZOOM	In full screen display mode, press the ZOOM button to zoom into the screen 2×. Use the ZOOM button with the JOG wheel to navigate the screen. See page 4–5. Press the ZOOM button again to exit zoom mode and return to full screen display mode.
DISPLAY <	Press the DISPLAY button to change the information shown on the display: • All the information is shown. • Removes the main title. • Remove the camera title and DVR status display. • Removes GPS location, speed, voltage, date and time. • Restores all information. While the DVR is recording in live mode, different information is displayed on the screen. See Figure 3-1, “On-screen display during live viewing and recording” on page 3–2. Table 3-1 on page 3–2 describes the items.
<	Press the < button to go to the previous field in menu mode when you are configuring the DVR.
CLEAR	When configuring the DVR, press the CLEAR button to restore the value in the field to the factory default value.
LOCK >	Press the LOCK button for three seconds in Live or Record mode to enable a One-Time password option.
>	Press the > button to go to the next field in menu mode when you are configuring the DVR.

Table 4-1 Using the DVR buttons

Button	Description
MENU	Press the MENU button to enter the main menu of the DVR. The menus can be entered in Live, Record, or Playback mode. Several program options can only be changed when entering the menus from Live mode. For example, if the DVR is recording and you enter the menus, the Record Quality cannot be changed. Press the STOP button to stop the recording and then enter to menus to change recording parameters. Press the MENU button at the main menu to exit the menu system and return to the previous display mode and operation.
REC (CH1)	Press the REC button to start the DVR recording if the DVR is not playing video or in the menus. When the DVR is recording, the REC button is illuminated. Press CH1 with the FULL button to select Camera 1 (CH1).
REV.PLAY (CH2)	During playback or when the video is stopped, press the REV.PLAY button to start playing the video in reverse. Press CH2 with the FULL button to select Camera 2 (CH2).
STOP (CH3)	Press the STOP button stops the DVR from recording or playing. If the DVR is recording, pressing the STOP button allows about five seconds before the DVR starts recording again. During this time, you can enter the menus, start to play back video, or copy video to the USB memory card. Press CH3 with the FULL button to select Camera 3 (CH3).
PLAY (CH4)	If the DVR is not recording, press the PLAY button to start playback of the recorded video and audio. Press CH4 with the FULL button to select Camera 4 (CH4)
PAUSE (5)	Press the PAUSE button to pause the video playback and provide a still frame video image.
SEARCH (6)	Press the SEARCH button for a power search function that lets you quickly find the desired information. Exit the Search menu by pressing the MENU button. See “4.5.3. Using the Search function” on page 4–7.
COPY (7)	Press the COPY button to go to the Copy menu. Exit the Copy menu by pressing the MENU button.
ENTER/ONE-TOUCH/(8)	While configuring in the menu mode, the ENTER button acts as the ENTER key. Press the ENTER button to navigate to the selected sub-menu. Press the ONE-TOUCH button to start One-touch download. See “4.5.2. Using the ONE-TOUCH Download option” on page 4–7.

4.2. Viewing Recorded Video

To playback video:

1. If the DVR is not recording, press the **PLAY** button to start playback of the recorded video and audio.
2. During playback or when the video is stopped, press the **REV.PLAY** button to start playing the video in reverse.

4.2.1. Using the SHUTTLE Wheel during Playback

During playback, the SHUTTLE (outer) wheel can be used to speed up the reviewing process. The play-speed is displayed on the screen.

1. During playback, turning the SHUTTLE wheel clockwise speeds the play forward from 1× to 2×, 4 ×, 6 ×, 8×, 16 × and 32× the normal speed.
2. During reverse playback, turning the SHUTTLE wheel counter clockwise speeds the play backward from ×1 to 2×, 4 ×, 6 ×, 8×, 16 × and 32× the normal speed.
3. When the **PAUSE** button is pressed, turning the SHUTTLE wheel clockwise reduces the play to a very slow forward rate.
4. When the **PAUSE** button is pressed, turning the SHUTTLE wheel counter clockwise reduces the play to a very slow backward rate.

This can be very useful when trying to identify the exact image where an incident occurs.

4.2.2. Using the ZOOM Button and JOG Wheel to Adjust the Display

To adjust the display using the ZOOM button and JOG wheel:

1. Turn the JOG wheel to shift the screen image left or right until it is in the desired position.
2. Press the **ENTER** button.
3. Turn the JOG wheel to shift the screen image up or down.
4. Press the **ENTER** button.
5. Repeat until the display is centered on the object of interest in both directions.

4.3. Replacing the Hard Drive

The EX4 Plus 35 DVR has a removable hard drive that is contained in a hard drive tray. The hard drive has a lock which secures the hard drive during operation. Use the hard drive key to lock and unlock the hard drive.

Important: While the hard drive is hot-swappable, (the hard drive can be removed when the DVR is powered up), do not remove the hard drive while the DVR is recording as the video segment may not be recorded. Press the **STOP** button before unlocking and removing the hard drive.

To remove the hard drive:

1. Press the **STOP** button.
2. Use the hard drive key to unlock the hard drive on the front panel.
3. Insert the hard drive key, turn counter clockwise by $\frac{1}{4}$ turn until the drive lock is in the unlocked position.

The Hard Drive power indicator (green) turns off.

4. Lift up on the hard drive tray handle and gently pull out the hard drive.

To install the hard drive:

1. Slide in a hard drive tray until the tray seats inside the front panel.
2. Ensure the handle is lying down against the tray.
3. Insert the hard drive key, turn clockwise by $\frac{1}{4}$ turn until the drive lock is in the locked position.

The Hard Drive power indicator (green) illuminates.

4.4. Downloading Video to a PC

Downloading video to a PC is described in the *Hard Drive Reader's Manual* (document part number 700-0036). Please refer to this user guide which is available online at **www.seon.com**.

4.5. Extended Operational Functions

4.5.1. Reading CAN messages

Contact Seon Design for assistance in setting up CAN messages for your DVR. The Smart-Link module will require programming for your specific applications.

4.5.2. Using the ONE-TOUCH Download option

Using the USB port, you have the option to download specific information to a USB drive.

To use the ONE-TOUCH download option:

1. In the System menu, select the ONE-TOUCH DOWNLOAD option. See “3.2.10. Using the System Menu” on page 3–24.
2. Insert a USB drive into the USB port on the front panel of the DVR.
3. If the DVR is powered off, press the **POWER** button for 3 seconds to power up the DVR.

The red LED on the **MODE** button or **FULL** button illuminates.

OR

4. If the DVR is powered up and recording, press the **STOP** button and wait until the red LED on the **REC** button is not illuminated.

ONE-TOUCH DOWNLOAD does not work while the DVR is recording.

5. Press the **ENTER/ONE-TOUCH/8** button.

The DVR downloads the appropriate information to the USB thumb drive and the red LED in the **ENTER/ONE-TOUCH/8** button flashes. When the operation is completed successfully, the red LED turns off.

Important: The red LED on the **ENTER/ONE-TOUCH/8** illuminates if there is an error, such as a bad USB drive or if the USB drive is full.

6. Remove the USB drive and power the DVR off by pressing the **POWER** button for 3 seconds.

OR

7. Press the **REC** button to return to recording.

4.5.3. Using the Search function

The EX4 Plus 35 DVR includes a powerful search function that let you quickly find recorded information by event or by time/date.

To view the Search menu:

1. If the DVR is recording, press the **STOP** button on the front panel of the DVR to stop recording.
2. Press the **SEARCH** button.

The Search menu appears as shown in Figure 4-2.

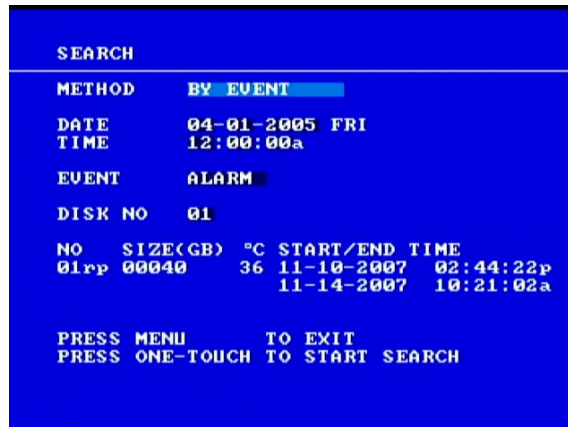


Figure 4-2 Search menu

To change a setting on the menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **ONE-TOUCH** button to start search.
5. To exit the menu, press the **MENU** button.

4.5.3.1. Searching for Recording Information BY EVENT

If BY EVENT is chosen, the DATE and TIME fields cannot be changed.
See Table 4-3.

To search for recorded information BY EVENT:

1. Choose the Event type.
2. Press the **ONE-TOUCH** button to bring up a list of events, which includes both alarms and regular recordings.
3. Turn the SHUTTLE wheel clockwise or counter clockwise to view the next or previous page of events.
4. To move through the list of events line by line, turn the JOG wheel clockwise or counter clockwise.
5. To search for a specific page number, press the **SEARCH** button to bring up the option to go to another page of events.
6. Turn the JOG wheel to change the page numbers, and then press the **ENTER** button to go to that page.
7. When the desired event has been chosen, press the **ONE-TOUCH** button to begin playing that event.

Several different types of events may be listed. Table 4-2 describes these events.

Table 4-2 Event types

Event	Description
N (Normal)	A normal recording session, started with the vehicle ignition.
T01–T12 (Timer 1 to 12)	Recording controlled by an internal timer
A01(Alarm 1)	An alarm event triggered by Alarm 1.
A02 (Alarm 2) A03 (Alarm 3) A04 (Alarm 4)	Alarm events triggered by Alarms 2, 3, or 4, available with EX4 Plus 35 DVR only.
PL (Power loss)	Similar to an alarm event, triggered by the unexpected loss of power to the DVR.
Video loss	Triggered by the loss of a camera signal.
RN	Recording after a power loss.

4.5.3.2. Searching for Recorded Information BY TIME/DATE

If BY TIME/DATE is chosen, the Event field cannot be changed.

To search for recorded information BY TIME/DATE:

1. Enter the desired DATE and TIME.
2. Press the **ONE-TOUCH** button to begin playing from that time and date (or the closest recorded video after that time and date).
3. Turn the **SHUTTLE** wheel clockwise or counter clockwise to view the next or previous page of events.
4. To move through the list of events line by line, turn the **JOG** wheel clockwise or counter clockwise.
5. To search for a specific page number, press the **SEARCH** button to bring up the option to go to another page of events.
6. Turn the **JOG** wheel to change the page numbers, and then press the **ENTER** button to go to that page.
7. When the desired event has been chosen, press the **ONE-TOUCH** button to begin playing that event.

4.5.3.3. Search Menu Configuration Items

Table 4-3 Search menu configuration items

Menu Item	Description	Values	Default
METHOD	BY EVENT is one of the two options for searching. If BY EVENT is selected, the EVENT field is active and the DATE and TIME fields are inactive. If BY TIME/DATE is selected, the EVENT field is inactive.	BY EVENT, BY TIME/DATE	BY EVENT
DATE	Set the date.	MM-DD-YYYY XXX (XXX is the 3-letter symbol for day of the week, for example FRI for Friday) • 01 to 12 for month • 01 to 31 for day • 2000 to 2037 for year	Not applicable
TIME	Set the time.	• 0 to 23 for 24 hour format • 12 A.M. to 1 p.m. for 12 hour format	Not applicable
EVENT	Set the event field.	ALARM, V. LOSS, ALL	ALARM
VIDEO LOSS	Shows a searchable event list of the event number, type of event, date and time when the camera signal was lost.	Not configurable.	Not applicable
DISK NO	DISK NO field only allows the 01 option.	01	01

4.5.4. Using the Copy Menu

The EX4 Plus 35 DVR can save information to a USB memory device.

To copy:

1. Insert a USB drive that has sufficient free space into the USB port on the front panel of the DVR.
2. If the DVR is in Live mode, press the **COPY** button.
3. If the DVR is recording, press the **STOP** button on the front panel of the DVR to stop recording.
4. Press the **COPY** button.

The Copy menu appears as shown in Figure 4-3.



Figure 4-3 Copy menu

To change a setting on the menu:

1. Turn the JOG wheel clockwise or counter clockwise to change the value.
2. Press the **LOCK >** button to advance through the fields.
3. Press the **DISPLAY <** button to move back through the fields.
The selected menu item is highlighted with a pale blue background.
4. Press the **ONE-TOUCH** button to start search.
5. To exit the menu, press the **MENU** button.

Table 4-4 Copy menu configuration items

Menu Item	Description	Values	Default
COPY	The first option lets you: • Copy VIDEO information from the DVR. • Download a small VIEWER program with very limited functionality which is designed for quick diagnosis of the video information. It is recommended that the Hard Drive Reader program be used to view video from the DVR.	VIDEO VIEWER	VIDEO
DISK NO	DISK NO field only allows the 01 option.	01	01
CAMERA NO	CAMERA NO option lets you pick the camera from which the video will be saved to the USB memory device	1 to 4	04

Table 4-4 Copy menu configuration items

Menu Item	Description	Values	Default
START DATE	START DATE and START TIME, as well as the END DATE and END TIME select the length of time to be saved to the USB memory device. Long video segments may take a considerable amount of time to copy to the USB memory device. The size of the video file is dependent on the Quality, Speed, and Resolution of the recorded video.	MM-DD-YYYY XXX (XXX is the 3-letter symbol for day of the week, for example FRI for Friday) • 01 to 12 for month • 01 to 31 for day • 2000 to 2037 for year	
TIME		• 0 to 23 for 24 hour format • 12 A.M. to 1 p.m. for 12 hour format	
END DATE		MM-DD-YYYY XXX (XXX is the 3-letter symbol for day of the week, for example FRI for Friday) • 01 to 12 for month • 01 to 31 for day • 2000 to 2037 for year	
TIME		• 0 to 23 for 24 hour format • 12 A.M. to 1 p.m. for 12 hour format	

4.5.5. Turning the Buzzer Off

The DVR has a built-in alarm buzzer that can be activated under certain warning or alarm conditions. The alarm buzzer settings can be configured in the SYSTEM menu. For more information, see “3.2.10. Using the System Menu” on page 3–24.

To turn the buzzer off:

1. Press the **ENTER** button to silence the buzzer.
2. Check your configuration settings in the SYSTEM menu to see which buzzer settings have been set to ON.

4.5.6. Using the LOCK Button

The front keypad on the DVR can be manually locked or unlocked by using the **LOCK** button or by changing the Password Enable settings in the System menu. See “3.2.10. Using the System Menu” on page 3–24.

If the Password Enable option is set to ON (enabled), the front keypad will be locked out and pressing the **LOCK** button will have no affect.

This works in Live mode, Record mode or Alarm Record mode.

4.5.6.1. Locking out the front panel keypad

To lock out the front panel keypad if the Password Enable option is OFF:

1. Press the **LOCK** button for 3 seconds.
The red LED on the **LOCK** button illuminates.
2. To disable the lock, enter the password while pressing the **FULL** button.
The red LED on the **LOCK** button does not illuminate.

4.6. Voltage Display

The EX4 Plus 35 System displays and records the input voltage of the vehicle on-screen. This can be a very helpful tool if problems are encountered with low voltage vehicle power supplies. If the voltage to the DVR is too low, the quality of the video signal from the camera will be very poor, resulting in a poor recording.

4.7. Low Voltage and Low/High Temp Indicator

In addition to the on-screen voltage display, the EX4 Plus 35 DVR has a LOW VOLTAGE/LOW/HIGH TEMP indicator on the back of the DVR. The indicator illuminates when the voltage level to the DVR is too low, as shown in Table 4-5.

Table 4-5 LOW VOLTAGE/LOW/HIGH TEMP indicator

Voltage level to DVR	LOW VOLTAGE/LOW/HIGH TEMP indicator will ...	Status of the DVR
Below 10.5 VDC	Illuminate	The DVR stops recording and begins to shut down as the voltage is too low to operate the camera properly.
Rises to 11 VDC	Turn off	The DVR operation returns to normal.

Smart-Link
voltage
indicator

The Smart-Link module also has a voltage indicator, which works differently than the LOW VOLTAGE/LOW/HIGH TEMP indicator on the DVR. For the Smart-Link, the green POWER ON/LOW VOLTAGE indicator illuminates when the DVR is powered up and the operating voltage is above 10.5 VDC. When the voltage falls below 10.5 VDC, the indicator flashes once every 2 seconds. If the voltage falls below 7.5 VDC, the indicator flashes quickly (about twice per second) and the DVR turns off the power to any attached peripherals (such as a GPS module or the driver's indicator panel).

The LOW/HIGH TEMP indicator also illuminates according to the temperature inside the DVR. These settings are described in "4.8. Advanced Smart-Temp".

4.8. Advanced Smart-Temp

The EX4 Plus 35 System incorporates several advanced features not found in any other system on the market such as the Advanced Smart-Temp™. Advanced Smart-Temp and the built-in heater ensure safe operation of the DVR over a wide temperature range.

Advanced Smart-Temp monitors the temperature inside the DVR to ensure the hard drive operates in a safe environment. In many areas, the temperature drops well below 40°F (4°C) and quite often below 32°F (0°C). Most computer hard drives are designed to work from about 40°F (4°C) to about 120°F (49°C).

Table 4-6 Advanced Smart-Temp features

Temperature inside DVR	Advanced Smart-Temp...	LOW/HIGH TEMP indicator status
Below 40°F (5°C)	Turns on the internal heater and pulses the system fan to circulate the warm air.	Flashes to indicate that the temperature is too low.
Below 5°F (–15°C)	Will not power the DVR at all, although the hard drive can still be removed from the DVR.	Flashes to indicate that the temperature is too low.
Above 113°F (45°C)	Turns on the system fan.	Flashes to indicate that the temperature is too high.
Above 140°F (60°C)	Shuts down the DVR to protect the hard drive from damage. The system fan continues to operate.	Flashes to indicate that the temperature is too high.

Maintenance and Returning Product for Service

This chapter provides information and procedures for performing periodic maintenance on the EX4 Plus 35 System and returning any part of the system for service.

5.1. Maintenance

5.1.1. Cleaning the Lock Box

The EX4 Plus 35 System lock box is made from 18 gauge steel, coated with an outdoor powder paint and only requires periodic cleaning. To clean the lock box, use a damp cloth with a mild detergent. Do not allow water into the ventilation holes on the lock box.

5.1.2. Cleaning the Camera and Window

The camera has a powder painted stainless steel enclosure. To clean the camera enclosure, use a damp cloth with a mild detergent.

To clean the camera window, use a soft, clean cloth to avoid scratching the window.

5.1.3. Replacing the Fan Filter

Depending on the operating environment, the fan filter on the back of the DVR enclosure may need to be changed occasionally. Check the filter monthly for excess dirt and replace the filter when it restricts airflow. Failure to replace a blocked filter may result in the DVR shutting down on a hot day due to inadequate air circulation.

If you need a new fan filter, contact your dealer or Seon Design to obtain a replacement.

To replace the fan filter:

1. Remove the filter cover by gently prying it off with a small flat screwdriver.
2. Discard the used filter and place a new filter back into the filter holder.
3. Push the filter cover back into the holder and snap it into place.

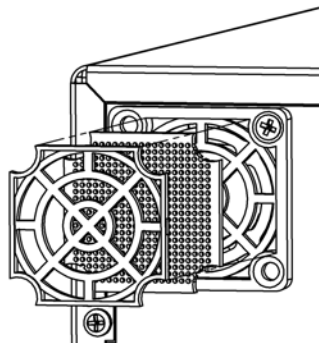


Figure 5-1 Replacing the fan filter

5.2. Returning Product for Service

If any part of the EX4 Plus 35 System is to be returned to Seon Design Inc. for service, please contact Seon, provide the model or serial number of your unit, and ask for a Return Authorization (RA) number. An RA number allows the service technicians to better track your product when it comes in for service. Please have the RA number clearly marked on the outside of the shipping box. **ANY PRODUCT SENT TO SEON DESIGN INC. WITHOUT AN RA NUMBER MAY BE REFUSED.**

The contact numbers for Seon Design Inc. are:

Toll Free Telephone	1.877.630.7366
Direct Telephone	604.941.0880

Please refer to the “SEON DESIGN® INC. PRODUCT WARRANTY” on page W-1 to review the terms of warranty service, contact and shipping information, as well as other important issues regarding the service and operation of your system.

Troubleshooting

This chapter provides information and procedures on troubleshooting the EX4 Plus 35 System.

6.1. Troubleshooting the EX4 Plus 35 System

The EX4 Plus 35 System is designed for high reliability of operation. If, however, you have any problems with your system, read this Troubleshooting chapter. If you cannot resolve the issue, contact Customer Service at Seon Design.

Symptom	Possible Cause and Solution
All problems.	Many system problems are caused by issues with the power supplied to the DVR. Check the following: • The voltage to the system may be too low. Check the LOW VOLTAGE indicator on the back of the DVR. See “Back panel” on page 1–6 for location of the LOW VOLTAGE indicator. • The power harness from the DVR must be connected as close to the battery as possible. Check the wiring to the battery. See “2.6. Step 5: Connecting the Power and Ignition Harness, Fuses, and Fuse Holders” on page 2–10. • Check the in-line fuses and fuse holders. If a fuse is blown, determine the cause before replacing it.
The DVR does not power on.	• Is the internal temperature below 40°F (4°C)? Check the flashing Low Temperature indicator on the back panel of the DVR. The DVR temperature must be above 40°F to operate. The DVR internal heater can help to quickly raise the internal temperature of the DVR. • Is the power and ignition harness plugged into the DVR securely?
The DVR turns on but does not start recording.	• Check the ignition wiring from the power input harness. Is the yellow wire connected to an ignition switched circuit? • Is the hard drive installed properly with the key in the locked position on the front panel? • Is the temperature below 40°F? Check the flashing Low Temperature indicator on the back of the DVR. Wait for the DVR to warm up and start recording. • Is the temperature above 122°F (50°C)? Check the flashing LOW TEMPERATURE indicator on the back of the DVR. Check the fan filter on the back panel for any blockage. If necessary, replace the fan filter. See “5.1.3. Replacing the Fan Filter” on page 5–2. • Check the battery voltage. • Check the settings for Record Delay-On time in the Record menu. See “3.2.4. Using the Record Menu” on page 3–8. • Are the timers on?
There is no picture on the video monitor output.	• Check the connections inside the camera, as well as the connections inside the DVR lock box. • Is the LOW VOLTAGE indicator on the back panel illuminated?
The live camera picture is snowy, fuzzy, or grainy.	• Check all connections inside the camera. • Is the camera cable damaged? • Check the connections inside the DVR lock box. • Is the DVR power harness connected directly to the bus battery?
The playback picture is snowy, fuzzy, or grainy.	• Is the power input harness connected to the battery? • Check the video monitor cable attached to the front or back of the DVR.

Symptom	Possible Cause and Solution
No audio on playback.	• Is the sensitivity adjustment on the audio module in the camera turned down too low? • Is the camera cable wired correctly to the terminal blocks inside the camera? • Is the camera connector damaged or not plugged into the DVR securely? • Is the record audio feature disabled?
Buzzer is sounding.	Press the ENTER button on the front panel of the DVR. Check to determine what caused the buzzer to sound and clear the problem.

Appendix A

Specifications

This appendix provides the product specifications for the Explorer EX4 Plus 35 Mobile Digital Video Recording (DVR) System.

Note: Specifications are subject to change without notice.

A.1. EX4 Plus 35 DVR

Video Input/Output	75 Ohm NTSC video
Video Resolution	720×480, 720×240, 360×240 pixels
Video Compression	MPEG-4
Hard Drive Style	3.5"
Hard Drive Size	40 GB to 750 GB
Hard Drive Removal	Hot swappable, locking key-secured
Camera Input Connector	4 × 6-pin mini DIN connectors
Audio Input Level	−8 dBm
Audio Output Level	−6 dBm, 10 kΩ
Operating Temperature	−4°F to 122°F (−20°C to 50°C)
Non-operating Temperature	−22°F to 158°F (−30°C to 70°C)
Operating Humidity	90% relative humidity, non-condensing
Operating Voltage	11 to 17 VDC
Transient Protection	1500 W
Temperature Protection	Advanced Smart-Temp
Ingress Protection	IP 53
Power Harness Connector	2-pin Molex
Alarm Input Connector	2-pin Molex
Network Connector	8-pin RJ-45 Ethernet
Dimensions (H × W × D)	3.75 × 8.5 × 12.5" (95 × 216 × 318 mm)
Weight	7 lb (3.2 kg)
with SCT-LD brackets	8.5 lb (3.85 kg)
Power Circuit Fuse	5 A
Ignition Circuit Fuse	1 A

A.2. DVR Functional Features

Time Format	12 Hour or 24 Hour mode
Date Format	MM/DD/YYYY, DD/MM/YYYY and YYYY/MM/DD
Daylight Saving Time	ON (Automatic) and OFF, Configurable Start and Stop
Main Title	24 characters
Camera Titles	12 characters per camera
Repeat Record	User selectable ON/OFF
Record Delay-On	0 seconds to 60 minutes
Record Delay-Off	0 seconds to 60 minutes
Power Delay-Off	0 minutes to 255 minutes
Daily Timers	12
Alarm Input	1, User selectable ON/OFF with variable recording speed, Image Quality and Alarm Duration
Playback Search	Time/Date, Alarm, or Event
Playback Speed	Image-by-Image, 2×, 4×, 6×, 8×, 16×, 32×
USB Memory Device	SanDisk Cruzer® Mini or equivalent

A.3. Additional Features of the EX4 Plus 35 DVR

Signal Inputs	10
GPS Input	Latitude, Longitude, Vehicle Speed and UTC time
Alarm Input	User selectable ON/OFF with variable recording speed, image quality and alarm duration
Speed Input	Pulse counting, GPS or CAN network
Driver's Indicator Panel	Indicates DVR power status, recording status
CAN Network	10 signal inputs, factory configurable

A.4. Lock Box

Main Enclosure	18 GA cold rolled steel (CRS)
Enclosure Brackets	18 GA CRS
Coating	Outdoor polyester powder paint, black
Tray Slide Rails	Industrial UHMW-PE
Door Lock	Industrial cam lock, keyed alike. Different keying available.
Dimensions (H × W ×D)	4.5 × 12 × 15" (114 × 305 × 380 mm)
Weight	8 lb (3.6 kg)

A.5. Smart-Link™ Module

Power Harness Connector	4-pin Molex
Auxiliary Power Output Connector	2-pin Molex
GPS Input Connector	4-pin Molex
Signals Connector	6-pin Molex
CAN bus Network Connector	4-pin Molex
Serial Port/GPS	9-pin DB9
Alarm Input Connector	8-pin Molex
Indicator Panel Connector	5-pin Molex
Speed Input Connector	3-pin Molex
Dimensions (H × W ×D)	5.875 × 3.25 × 0.875" (150 × 83 × 23 mm)
Weight	5.6 oz (160 g)
Material	14 GA aluminium, anodized black

SEON DESIGN® INC. PRODUCT WARRANTY

Seon Design Inc. (Seon) warrants the cameras and components listed below against defects in workmanship and materials provided that such defects appear or are discovered within the respective periods specified below and provided further that the purchaser of such products notifies Seon of such defects within thirty (30) days of the appearance or discovery of such defects:

- Five (5) years from date of purchase parts and labor on the SA Wedge Camera Series
- One (1) year from date of purchase parts and labor on the SA-IR Illuminator
- One (1) year parts and labor on the Explorer™ Mobile DVR Systems
- One (1) year from date of purchase parts and labor on all other products and accessories

All service/replacement parts and repairs are warranted for a period of 90 days.

Subject to the terms and conditions listed below, during the relevant warranty period, Seon will repair, replace, or refund the purchase price for the defective product, whichever Seon considers to be appropriate in the circumstances, in Seon's sole and arbitrary opinion, free of charge, any defective products returned prepaid. In the event purchaser has a problem with any Seon product, please call and request a **RETURN AUTHORIZATION (RA) NUMBER** from the Service Department.

Please call 877-630-7366 or (604) 941-0880 and ask for the Service Department. Be sure to have the model number, serial number and the nature of the problem available for the customer service representative. Prior authorization **MUST** be obtained for all returns, exchanges, or credits. **ITEMS SHIPPED TO SEON WITHOUT A CLEARLY IDENTIFIED RA NUMBER MAY BE REFUSED.**

Products returned will be tested to verify the defect. Upon verification of the defect, the product will be repaired or exchanged, or the purchase price will be refunded or credited to the customer's account, at the sole option of Seon. In the event of replacement, the returned product will be credited to the customer's account and a new invoice issued for the replacement item. Seon reserves the right to refund the purchase price or to issue a credit only in lieu of replacement.

Seon may use new or refurbished replacement parts for repairing its products, at its sole and arbitrary discretion. Seon may replace an entire unit with an equivalent model, at its sole and arbitrary discretion. If a unit is exchanged, the returned product shall become the property of Seon and the exchange product becomes the property of the purchaser, and the remainder of the warranty that applied to the original unit purchased shall apply to the exchanged product. Exchange units may be new units or units that have been repaired to full factory specifications at Seon's discretion.

If the product is found to be in good working order or its inability to function properly is not covered by this warranty, the product will be returned in the same condition as received unless repair is possible and requested by the customer. Repairs of such nature will incur a charge for parts and labor and will proceed only by agreement with the customer to accept the charge.

This warranty shall not apply:

- (a) to equipment not supplied by Seon;
- (b) to equipment, including, any components, which shall have been operated in excess of rated capacity, subject to negligence, accident, or damage by circumstances beyond Seon's control, or to improper installation, operation, maintenance, servicing, alterations or storage, modification without Seon's written authorization, misuse, vandalism, fire, floods or acts of nature so as, in Seon's exclusive and arbitrary judgment, to affect the same adversely; or
- (c) if the serial number for the product has been altered in any way.

- (d) if the product has been operated outside of the specified Operating Environment specified in the Seon Users Manual for such product.

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Any description of the goods or services, whether in writing or made orally by Seon or Seon's agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets or similar materials used in connection with customer's order are for the sole purpose of identifying the goods and/or services and shall not be construed as an express warranty. Any suggestions by Seon or Seon's agents regarding use, applications or suitability of the goods and/or services shall not be construed as an express warranty unless confirmed to be such in writing by Seon. Purchaser assumes full responsibility for selecting products to achieve purchaser's intended purposes, for properly installing and using those products, and for verifying the results obtained therefrom.

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Without limiting the generality of the foregoing, Seon specifically disclaims any liability for property or personal injury damages, penalties, special or punitive damages, damages for lost profits or revenues, loss of use of goods or any associated equipment, cost of capital, cost of substitute goods, facilities or services, down-time, shut-down or slow-down costs, or for any other types of economic loss, and for claims of customer's customers or any third party for any such damages. Some jurisdictions do not allow limitation or exclusion of incidental or consequential damages, so this limitation or exclusion may not apply to purchaser. In no event shall Seon's total liability for any damages to purchaser or any other person in connection with the products or this agreement exceed the lower of the suggested list price or the actual price paid for the products, regardless of whether such liability arises from contract, tort, warranty or any other form of claim.

If any provision of this agreement is found to be void, invalid, or unenforceable, that finding shall not affect the remaining provisions, all of which shall be enforced to the full extent permitted by law. If any remedy hereunder is determined to have failed of its essential purpose, the limitations of liability and exclusion of damages set forth above shall remain in full force and effect. This agreement may be modified only in writing signed by a duly authorized representative of Seon.

Provisions Applicable to American Customers

For those customers whose mailing address is in the United States, Seon's offer and any agreement of sale resulting therefrom shall be governed by and construed in accordance with the internal and domestic laws of the State of WASHINGTON without giving effect to the conflict of laws rules thereof. The Superior Court of Washington for Whatcom County and U.S. District Court for the Western District of Washington ("the U.S. Closed Courts") shall have exclusive jurisdiction to entertain and determine all disputes and claims, whether for specific performance, injunction, declaration or otherwise arising out of or in any way connected with the construction, breach, or alleged, threatened or anticipated breach of the contract resulting from this offer and shall have jurisdiction to hear and determine all questions as to the validity, existence or enforceability thereof. Customer specifically consents to such Court's exercise of jurisdiction over it. The purchaser attorns to the exclusive jurisdictions of the jurisdiction of the U.S. Closed Courts, waives any obligation to venue in any action or proceeding regarding Seon Products and waives any objection that the U.S. Closed Courts are an inconvenient forum or do not have jurisdiction over the purchaser of Seon. The United Nations Convention On Contracts For The International Sale Of Goods shall not apply.

Provisions Applicable to Canadian Customers

For those customers whose mailing address is in Canada, Seon's offer and any agreement of sale resulting therefrom shall be governed by and construed in accordance with the internal and domestic laws of the Province of BRITISH COLUMBIA and the laws of Canada applicable therein without giving effect to the conflict of laws rules thereof. The courts of British Columbia (the "Canadian Closed Courts") shall have exclusive jurisdiction to entertain and determine all disputes and claims, whether for specific performance, injunction, declaration or otherwise arising out of or in any way connected with the construction, breach, or alleged, threatened or anticipated breach of the contract resulting from this offer and shall have jurisdiction to hear and determine all questions as to the validity, existence or enforceability thereof. The purchaser attorns to the exclusive jurisdictions of the jurisdiction of the Canadian Closed Courts, waives any obligation to venue in any action or proceeding regarding Seon Products and waives any objection that the Canadian Closed Courts are an inconvenient forum or do not have jurisdiction over the purchaser of Seon. The United Nations Convention On Contracts For The International Sale Of Goods shall not apply.

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